VOL. 4, NO. 11. NOVEMBER, 1906

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW.

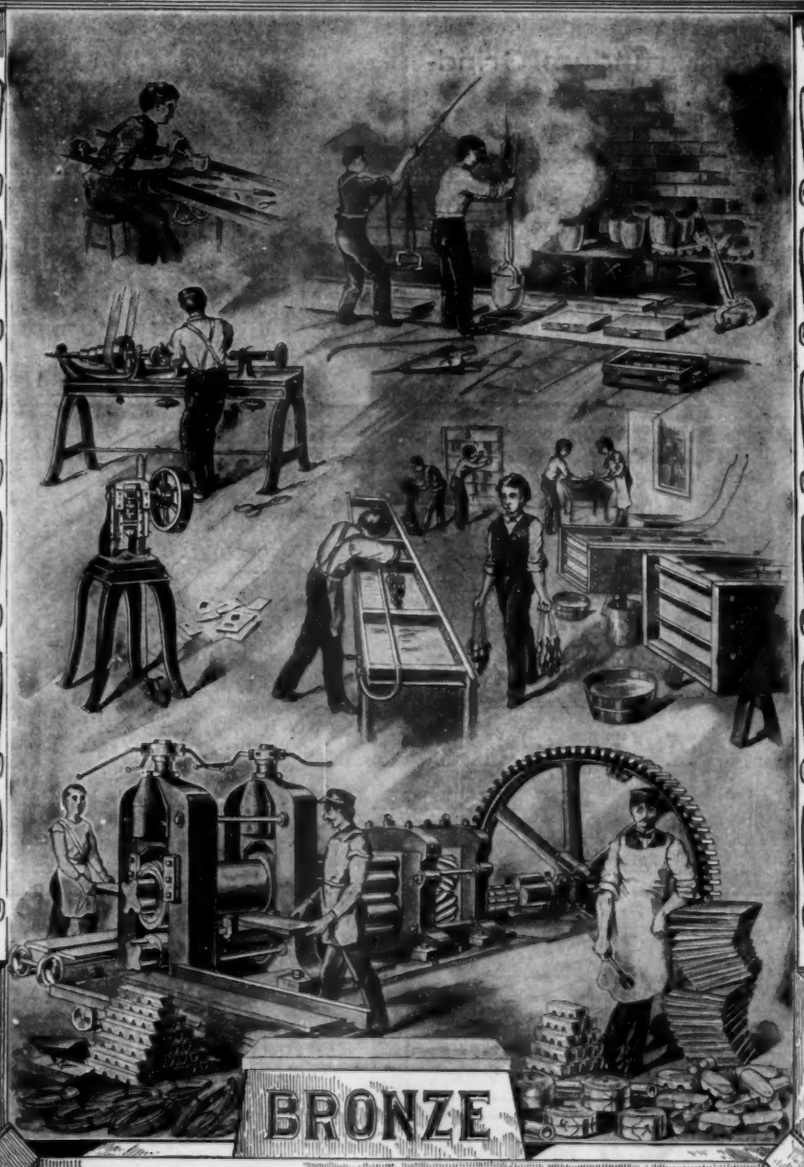
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · NICKEL · TIN · SILVER · LEAD · GOLD · ZINC · BRONZE

METALLOGRAPHY · BRASS · METALLURGY

ROLLING · DRAWING · STAMPING · SPINNING · PLATING · POLISHING

MELTING · REFINING · ALLOYING · CASTING · FOUNDING · FINISHING



OLD SERIES FOUNDED OCT., 1894 FOUNDED JAN., 1903 NEW SERIES

LABOR OMNIA VINCIT "LABOR CONQUERS EVERYTHING"

NEW YORK.

61 BEEKMAN ST.

$1.00 PER YEAR 10 CTS PER COPY

Entered February 10, 1903, at New York, N. Y., as second-class matter under act of Congress, March 3, 1879.

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THE METAL INDUSTRY
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AND
ELECTRO PLATERS REVIEW

PUBLISHED MONTHLY BY

The Metal Industry Publishing Company

(Incorporated)

61 BEEKMAN STREET, NEW YORK

Telephone No. 4983 Beekman. Cable Address, Metalustry.

PALMER H. LANGDON, ... *Editor and Publisher*
S. D. V. BURR, ... *Mechanical Editor*
JOHN B. WOODWARD, ... *Director*

Subscription Price $1.00 per year, postpaid to any part of the world. Single copies, 10 cents.

ADVERTISING RATES ON APPLICATION.

ENTERED FEBRUARY 10, 1903, AT NEW YORK, N. Y., AS SECOND CLASS MATTER UNDER ACT OF CONGRESS MARCH 3, 1879.

CONTENTS.

THE PYROMETER IN THE METAL INDUSTRY.

It had long been recognized by managers of brass and copper mills that the pyrometer would be a most valuable instrument in many operations if certain defects in the instrument could be overcome. These related both to the design of the device and its construction. Its form was such as to prohibit its use in many of the most important directions; it was limited by this to applications along restricted lines only. Its wider employment was negatived by its shape and by the fact that it could only be applied within certain ranges.

The other and more serious objection was its extreme tenderness; it would break under the least provocation. It had to be handled with exquisite care and even when manipulated by the expert accidents would occur with altogether too great frequency. It was a beautiful laboratory instrument and admirably adapted to laboratory experiments requiring measurement of high temperatures; but when used by those untrained in the manipulation of delicate and fragile instruments it failed. The ordinary manager of a works had not time, neither could he see the possible profit in training his men to that delicacy of touch necessary to its handling. In addition its first cost was beyond its usefulness. As a part of the equipment of the ordinary mill it would not pay to introduce it. Mill operators understood and appreciated its value perfectly and would have freely adopted it, provided the objections enumerated above could have been eliminated.

But all this has been changed with the improved form of the instrument as it is placed on the market to-day. It has advanced to the rough and ready stage where it requires neither a trained expert nor unusual care; it can be used to advantage by the men of the shop in precisely the same manner as other tools; in truth, it is now a tool and not an instrument.

This transformation has been accomplished without sacrificing the accuracy of the instrument; in fact, it is more reliable now as an indicator of high temperatures than ever before. One important feature has been introduced which is of great moment and that is the rapidity with which the temperature can be found. The result is read upon a large scale along which travels the pointer. The indication is practically instantaneously and can be maintained as long as may be desirable. This has been found to be of great advantage in annealing sheets, in heating billets for the Mannesmann tube drawing process and other operations where it is essential to heat the material to a predetermined degree. The temperature of the four corners of a sheet in the furnace can be ascertained by simply touching the sheet with the end of the instrument introduced through the furnace door. In drawing Mannesmann tubes the temperature of the blank is of the first importance; a metal too hot or too cold affects the results injuriously. The pyrometer has been used

the results injuriously. The pyrometer has been used successfully in the manufacture of brazing spelter where the temperature of the metal must be very exact before going to the crushers. It has also found application in the extruding method of making rods, where a difference of a very few degrees either way is hurtful. In the heating of lead baths for tempering and hardening it has been quite largely adopted. For this work the end of the instrument is simply dipped into the molten metal and the temperature noted upon the gauge.

The modern pyrometer is founded upon the principle of the thermo-electric pile, the action of which has been well known for very many years. It depends upon the variation in the electrical conductivity of metals when heated to different temperatures. In the modern pyrometer the couple, so-called, is made of two metals or alloys, comparatively low in cost, which are placed parallel with and insulated from each other. The electric circuit is completed when the two ends are placed in a molten bath of metal or when they are touched to a hot plate or billet. The indicator may be placed in any desirable location, near or far away from the material to be handled. As the exposed ends of the couple wear away additional portions may be brought into use; this is not a serious item of expense since the metals in the couple are inexpensive.

The pyrometer is now arranged so as to give automatic continuous records of changes of temperature. It is eminently a tool which has been developed for manufacturing operations and has many characteristics making it peculiarly suitable for the copper, brass, bronze and allied industries.

UNIVERSITY TRAINING FOR JEWELERS.

The Birmingham, England, jewelers have shown considerable enterprise in the training of their boys, as the equipment and success of the art school described in our July issue sufficiently shows. A strong effort is now being made to carry the movement further by bringing it into association with the Faculty of Commerce at the Birmingham University. At a meeting held September 25 Professor Ashley delivered an address on "University Education for Business Men in the Jewelry Trade," in which he outlined the course to be pursued and the advantages to be expected.

The problem to be solved was how those who had the management of their business and particularly those who were to follow them in the future were to be made more efficient business men and how the efficiency could be maintained. The idea was that the modern university ought to aim at providing training for all the higher grades of all the activities of modern society, so far as such training was a discipline and could be useful. The old universities supply the professions, but the new schools are first of all utilitarian. The professor believed that a programme of study and training could be arranged which would stimulate the powers of judgment, awaken the imagination and widen the sympathy.

The University of Birmingham created the Faculty of Commerce, which has proved eminently successful, but it had hardly any representatives of the jewelry trades. And since the university itself was made possible by Birmingham enterprise, it should make return as lay in its power. The course is not intended for workmen, but for those who in future will take responsible positions in the jewelry trade. It would cover the strictly commercial aspects of the question, together with the manufacturing and technical details. Other matters dealt with would be the location and laying out of works and offices, capitalization, production, works management, choice of markets, market fluctuations and the entire relation of selling prices to cost.

ORDERING TUBING.

In the October number of THE METAL INDUSTRY we published directions of the best method of ordering sheet brass, in which we advocated the use of the micrometer gauge, and we understand that this is generally considered the best practice in ordering sheet metal. In ordering seamless tubing the micrometer gauge is also frequently used and for exact size it is necessary. Where, however, the user does not require the tubing to be exact, a few thousandths in the gauge one way or the other making no difference, it is considered more economical and satisfactory to order by gauge. The tube manufacturer is not thus bound down by such exactions and can turn out the product at a lower figure than when he is required to make his tubing to strict measuremnets.

PRODUCTION OF ZINC.

The principal countries producing spelter are Germany, the United States and Belgium. Great Britain, France and Holland produce smaller but still important quantities. According to Mineral Resources zinc ores come most largely from the United States and Germany, though there is important production from Spain, Italy and Australia. The most important changes in the ore situation of recent years have been the rapid growth of production in the United States and Australia, and the stationary or declining output of European countries. Mexico and Canada are now regularly shipping ore, the former in considerable quantities. Canada has also become a smelting center and is likely in the future to ship metal rather than ore.

MINERALS IN THE TRANSVAAL.

The British and South African *Export Gazette* reports Richard Hasken, a prominent merchant of Johannesburg as follows in regard to the base metals of that country:

Practically all base metals are to be found and discovery has only just begun. Some early shipments of tin and lead have been made during the past month, and copper will also be an item of export shortly. Tin from the bushveld has panned out remarkably rich at the surface, and the beginnings of a big industry are being made. Many new works will presently be erected in connection with tin alone, and large quantities of machinery must be purchased if the great deposits of ore are to be adequately mined. Then, too, I know of no richer lead lodes than those of the Transvaal; our deposits of the purest china clay go to exceptional depths; and we also possess raw material on which to found an asbestos industry. The country is so highly mineralized, in fact, that its enormous possibilities can not at present be realized.

In dipping brass or bronze castings it sometimes happens that a slight coating of sulphate of zinc remains on the castings when they are dried out, which coating makes them unsightly. If the castings after dipping are rapidly passed through the potash solution and again through the acid wash waters this white surface will be removed, leaving the metal clear and bright.

DAMASCENING AND INLAYING AND BLENDING OF METALS.

We are probably indebted to the East for the beautiful art of damascening, which is the inlaying of one metal with another, usually gold or silver upon iron or steel. The metal to be inlaid is dovetailed or undercut in order to securely hold the pattern. This process is very different from that producing the peculiar wavy appearance of the Damascus sword blades. The latter is due to slight variations in the steel of which the sword is made, the result of welding together bars or rods of slightly different character. Another method of inlaying was to hatch in lines with a graver and hammer the gold or silver into the roughened surface, afterward restoring the ground by polishing. These processes have been employed all through the East and with almost every kind of metal.

CHARTERHOUSE COAT OF ARMS. COPPER INLAID WITH ZINC.

The method discovered by Sherard Cowper-Coles, of London, England, is different in all essential particulars from the old way. His process depends upon the fact that metals in a fine state of division give off vapor or volatilize when raised to a temperature several hundred degrees below their melting point and this vapor will condense on solid metal placed in the powdered metal.

This discovery has been turned to account for the inlaying and ornamenting of metallic surfaces, with results similar to damascening, but with the advantage of there being no risk of the metals separating, as is often the case in damascening. With this process new effects can be obtained and the number of metals and alloys available has been increased. The thickness and depth to which the metals are to be inlaid and onlaid can be controlled at the will of the operator.

The article to be treated is covered with a stopping-off composition, those portions which are to be inlaid being left exposed. The design is traced with a sharp edged tool and those portions to be removed are lifted and cleared away. The object thus prepared is placed in an iron box containing the metal which is to be inlaid in a powdered form. If zinc is the metal to be inlaid, zinc dust is the powder employed, which is a product obtained direct from the zinc smelting furnaces. The iron box is then placed in a suitable baking oven and heated to a temperature many degrees below the melting point of zinc, which is 686° F., so that the temperature to which the box is heated is about 500° F.

The time and temperature are regulated according to the thickness and depth of the inlaying required and varies from a few minutes to several hours. When the

DRINKING CUP. PEWTER INLAID WITH ZINC.

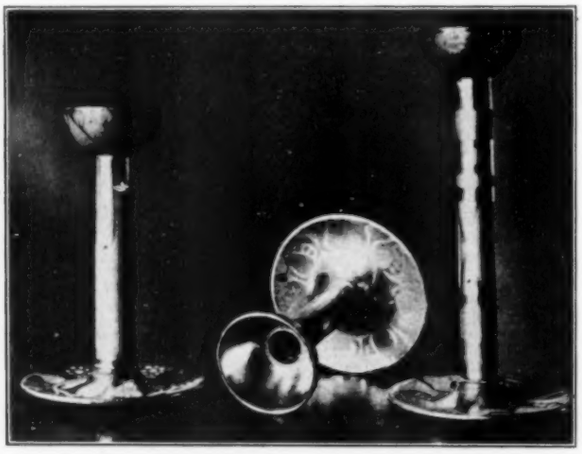
heat has been maintained for a sufficient time the article is removed and the stopping-off composition brushed off. The process can be repeated several times when it is desired to inlay two or more metals.

A feature of considerable importance is the variety of colors and alloys which can be obtained in one operation of baking. A copper tray can be inlaid with zinc and at the same time certain portions can be converted into brass. This is done by varying the thickness of the stopping-off composition and by baking at a somewhat higher temperature than would otherwise be employed. The result is that portions can be converted into golden colored brass, the other portions remaining unalloyed copper. When desired the zinc can be raised as much as 1-16 of an inch.

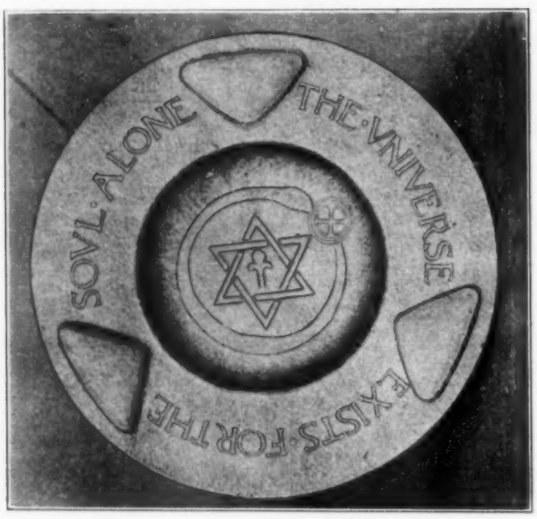
The new process is not confined to flat surfaces, but can just as easily be applied to raised surfaces. It is

also adapted to the finest work as well as very bold effects. The color values range from silver white zincs to yellow brass and bronzes of various shades, graduating to red copper and tones of yellow and golden brown.

A peculiarity of the inlay is that it has not the sharp line of demarcation found in damascening, but there is a soft transition from the inlaid metal to the surrounding metal. The process is not confined to zinc and



COPPER CANDLESTICKS INLAID WITH ZINC.



BRASS TRAY INLAID WITH ZINC.

copper; it has been applied to nickel, cobalt, antimony and aluminum.

THE CHEMISTRY OF ELECTRO-PLATING.

(Continued from September.)

PART II.

In getting a good deposit from the plater's point of view, the problem as to the conditions under which the deposit is composed of very small, microscopic crystals.

When we precipitate a salt by chemical means we get larger crystals, the slower the precipitation and the higher the temperature. We should therefore expect that an electrolytic deposit will be coarser the lower the current density and the higher the temperature, provided all other conditions are held constant. The conclusion as to the current density is confirmed by all experiments. The case of the temperature change is a little more complicated.

For a given current density, temperature and salt solution, we should expect a coarser-grained deposit the more concentrated the solution. This has been found to be the case in experiments with zinc sulphate and sodium zincate solutions. Since the potential difference between the metal and the solution is less the more concentrated the solution, it seems probable that this is an important factor when we change from one solution to another. Other conditions being the same we shall get the smallest crystals, the greater the potential difference between the metal and the solution. This is the recognized explanation for the excellent character of the deposits from cyanide solutions.

A natural corrollary from this last is that the deposit will be more finely crystalline, the greater the solvent action of the solution. This accounts for the

BRIGHT STEEL PANEL INLAID WITH ZINC.

small crystals that are obtained from an acid copper sulphate solution or from one containing nitric acid. This conclusion, of course, holds only within the limits for which we get a good deposit. The converse of this would be that reducing agents should increase the size of the crystals. Mr. Snowdon has found that addition of formaldehyde to a copper or a zinc solution does make the deposited metal more coarsely crystalline. Resorcine has a similar effect with zinc. It will be difficult to get conclusive evidence on this point because many reducing agents form complex salts and the effect due to this may easily overbalance the other. If the reducing agent acts only to remove dissolved gases, its effect on the size of the crystals would probably be negligible.

(To be concluded.)

A method that is said to be used in connection with metallizing molds, for electrotyping, without the use of graphite, consists of applying a solution of nitrate of silver, followed by a solution of phosphorus in alcohol. The mold is then dried and the copper or nickel deposited on the surface in the usual manner.

THE DETERMINATION OF ZINC LOSSES IN THE CASTING SHOP.

By Andrew M. Fairlie.*

In the August issue of The Metal Industry the author pointed out in a general way the nature of metal losses in the copper and brass rolling mill, and dwelt particularly upon the heavy losses of zinc in the casting shop. It was stated that experiments have shown that from 15 to 30 per cent. of all zinc melted in the manufacture of alloys is lost by oxidation and volatilization. The percentage, of course, is always based on the quantity of zinc weighed for the crucible charge. This statement has been disputed by Mr. James R. Huber, connected with a Detroit (Mich.) brass works, who says in refutation that "casters make 90 per cent. bronze with a loss of ½ lb. of spelter (0.50%)." This amazing assertion needs verification, and Mr. Huber gives no data wherewith to verify it. He fails to give the amount of spelter weighed out, and without this information it is impossible to compute the percentage of zinc lost. With the help of the assumption that a "90 per cent. bronze" is an alloy containing 90 per cent. copper and 10 per cent. spelter, it would have been possible to calculate the amount of spelter weighed out, if we had the total weight of alloy melted; but Mr. Huber does not even give that. We are forced to calculate backwards: If a loss of ½ lb. of spelter is a loss of half of one per cent., then the amount of spelter weighed out must have been .5 divided by .005 or 100 lbs. And if this 100 lbs. of zinc was only 10 per cent. of the alloy, then the total weight of the alloy in this single crucible casting was 100 divided by .10 or 1,000 lbs.! Obviously here are errors of commission as well as of omission, and the figures deserve no further consideration.

The object of relating this incident is to illustrate the tendency in the casting shop to underestimate the extent of the zinc loss. It is interesting to know, however, that the losses are commanding the attention of the brass makers, and in view of this fact it seems desirable to describe two methods in common use for the determination of the percentage of zinc wasted. The first method is simple and easy of execution, but it is published with the warning not to use it, as the results are not reliable.

1.—Weigh the copper and zinc carefully, melt as usual and pour into the mold; when cool, weigh the alloy accurately. The difference does not give the weight of zinc volatilized, for metal is spilled among the ashes of the furnace and is skimmed from the top of the crucible before pouring. Accordingly an arbitrary correction is made for skimmings and spillings, and the results obtained are after all mere guess-work.

2.—Carefully weigh the copper and spelter, see that all that is weighed goes into a clean crucible, without scrap, and avoid spilling or skimming until the alloy is once thoroughly mixed. Skim and pour as usual. When the casting is cool, scrape two bright surfaces on opposite sides with a file. Wipe clean and dry, and with a perfectly clean half-inch bit drill holes through the brass, *without oil,* until an ounce or more of drillings is obtained. The drillings must be absolutely free from oil or any other foreign matter. Too much care cannot be exercised in getting the sample. Send the drillings to a reliable metallurgical chemist for the determination of the percentages of copper and zinc.† Upon receipt of the chemist's report calculate the weight and percentage of zinc lost by the following

Rule.—Subtract the percentage of zinc found by analysis from the percentage of zinc weighed out, and multiply by 100 (result A). Subtract the percentage of zinc by analysis from 100 (result B). Divide result A by result B. The quotient (result C) is the number of pounds of zinc lost per 100 pounds of alloy weighed out. Divide result C by the percentage of zinc weighed out, and multiply the quotient by 100. This product (result D) is the percentage of zinc lost, based on the amount of zinc weighed out.

Reducing this method of calculation to a formula, we have

$$x = \frac{100\ (S - S')}{\frac{S}{100}\ (100 - S')}$$

where S = percentage of zinc charged into the crucible, S′ = percentage of zinc found by analysis, and x = the percentage of zinc lost. The following example is given to aid those not accustomed to the use of formulas:

56 lbs. of copper and 44 lbs. of spelter were weighed out and melted in a crucible. No metal was lost by spilling prior to the thorough mixing of the metals. The resulting brass showed by anaylsis 39.8 per cent. zinc and 60.2 per cent. copper. What was the percentage of zinc lost based on the amount of spelter weighed out?

Solution: S = 44; S′ = 39.8. Substituting these values respectively for the symbols in the formula, we have

$$x = \frac{100\ (44 - 39.8)}{\frac{44}{100}\ (100 - 39.8)}$$

$(44 - 39.8) \times 100 = 420$ ..... (1)

$(100 - 39.8) \times .44 = 26.488$ ..... (2)

$420 \div 26.488 = 15.86$ ..... (3)

Proof: 15.86% of 44, the amount of zinc weighed out, is 6.98 lbs., the amount of zinc lost. The 56 lbs. of copper weighed out constituted, according to the analysis, 60.2% of the alloy. Hence 1% would be 56 ÷ 60.2 or 0.9302 lb., and 100% would be 100 times that, or 93.02 lbs., the total weight of alloy made 93.02 + 6.98, the amount of zinc lost, is 100 lbs., the total weighed out.

If scrap is used in making the alloy, the percentage of zinc lost is greater, and the calculation of results becomes more complicated, involving the analysis of the scrap as well as of the new metal. The limitations of this paper forbid further illustrations, however, and it is hoped that the one given will be of some service.

Those interested in the volatilization of zinc in the casting shop are referred to the article by Mr. Percy Longmuir, entitled "The Problem of Oxidation in Brass Foundry Practice," in The Metal Industry for May, 1906. Mr. Longmuir in four experiments found zinc losses ranging from 19 to 28.6 per cent. He shows, moreover, that as large a *percentage* of zinc may be lost when only 2 or 3 pounds are present in the alloy as when 40 pounds are present. The two most important factors determining the percentage of loss are probably the *maximum temperature* reached during the fusion, and the *length of time* that the metal remains molten after the zinc is added.

When using rock potash or caustic soda solution for cleaning, two oz. of common resin and one oz. of cyanide of potassium, added to a 40-gal. bath, will assist greatly in the cleaning and prevent the formation of oxides upon the surface of the metal.

*Chemist, Tennessee Copper Company, Copper Hill, Polk County, Tenn.

†If uncertain where to send the sample, inquire of the Editor of The Metal Industry.

EASTERN VS. WESTERN METHODS IN MANUFACTURING BRASS GOODS.

By William Hirschmann.

During a recent visit to the West, which was taken principally to observe the difference between Western and Eastern methods of manufacturing brass steam goods, I was agreeably disappointed to find that, as far as the large shops I visited were concerned, such a thing did not exist, inasmuch as it applied to tools, machinery, equipment, etc., necessary to up-to-date brass finishing. The principal difference I observed was not in methods, but in conditions. Owing to the fact that every manufacturer of improved machinery is doing his utmost to get his machines anywhere and everywhere, and to the fact that in this age of widely circulated literature concerning matters mechanical, everybody who wishes to keep up with the times is a reader of everything and anything that will help to keep him at the head of the procession, the knowledge of new machinery and the new methods they create is spread over the country, first by the manufacturer of the machines who is endeavoring to get out to the trade, and, secondly, by the expert mechanics who try them out and give their experience value through the trade journals who send it broadcast.

This occurred to me very forcibly when I saw in several shops new machines (the same as we are using), which had been placed on the market only a short while before. It also shows that the manufacturer is eager and willing to get any machine that proves itself a labor saver, no matter be he in the East or West. In every shop I was in they had some special machinery built and designed to meet their particular needs, which is just exactly what we do in the East. In several of the newly built shops that were running and also in two that were nearly completed, but not running, they were rigged to run each floor or room by means of independent motors, just as all new Eastern shops are being fitted up, showing again that the heads of these concerns are alive to the fact that a large percentage of power can thus be saved, as well as time, which is often lost when the whole plant is shut down because something may be wrong in one department only. A shut-down of ten or fifteen minutes means a whole lot more when two or three hundred men stand idle than it does when only twenty or thirty may be affected.

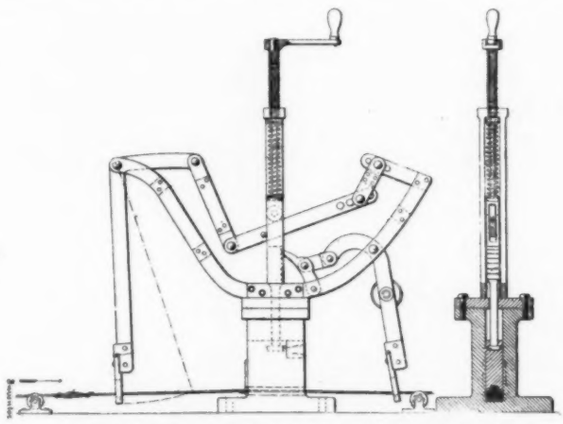
In the matter of tools they are in the same position as we in the East. Collapsible taps, opening dies, squaring chucks, double-end machines, automatic machines both for bar stock and castings, multiple drills, as we have them, I saw everywhere.

But speaking from the standpoint of a New Yorker, the conditions of labor are different. While the pay of a brass finisher in Detroit (I take Detroit as being the most important city engaged in the line I was interested in, for comparison) is from 10 to 15 per cent lower than in New York, he can live on that 10 per cent better than he could here. You can get more for your money and they have not as many ways of spending it as they have in New York. There almost every mechanic has his own little house and is not forced to live in the congested manner of his New York brother. Having more air, more room and more things to make a home what it should be, he is not open to the temptations that beset the path of the New Yorker. This, of course, has its effect on a man's day's work, for, being in a more rested condition, he feels inclined to "hustle" more. The climate, from what I experienced and found out by questioning, is not nearly so hard on a person's health as the New York climate. That also makes a great difference in the amount of work a man can turn out in a day.

Then again, the percentage of foreigners is smaller. In New York it is not unusual to have from 5 to 10 per cent of the help who are unable to speak a word of English. The percentage is considerably smaller in Detroit. The floating population is proportionally much smaller, and as a consequence they can depend upon a more stable working force. However, I heard from all sides complaints about the scarcity of skilled brass workers. Everywhere they were busy, with more orders than they could fill and from one to three months behind. That this condition exists in spite of the fact that more labor-saving machinery is being used now than ever before, certainly furnishes food for much thought. How would our grandfathers, with their primitive methods of brass finishing, manage to get out this tremendous amount of brass work that is turned out yearly? In the language of the day, I think there would be "nothing doing."

AUTOMATIC WIPER FOR GALVANIZED WIRE.

In the ordinary process of galvanizing wire, the wire as it comes from the galvanizing trough has to be wiped to take off the surplus material. As the wire comes from the bath it is provided at longer or shorter intervals with splices connecting the sections. These splices will not pass through a wiper of ordinary form and the usual practice is to station a man at the wiper to operate it to permit the splices to pass through. As the wire moves very quickly and as the man generally attends to a large number of wipers, a great loss of wire takes place, owing to the fact that the wiper is opened too soon and closed too late. Attempts have been made to provide wipers which will open automatically, but these machines have never come into general use.



AUTOMATIC WIPER FOR GALVANIZED WIRE.

The machine illustrated herewith, for which letters patent No. 832,691, October 9, 1906, have been granted to William S. Myers, of Ashland, Ky., provides an automatic wiper inexpensive to manufacture and simple and effective in operation. In this machine the wire passes in the direction shown by the arrow through wiping blocks lined with asbestos. It has an upper movable section held against the wire by the tension of the spring. This construction permits the passage through the wiping block of the splice and insures the wiping of the wire up to the splices, at the splice and the retreating end of the splice.

MAGNESIUM AS A DEOXIDIZER OF COPPER, BRASS, BRONZE, ALUMINUM, ZINC, TIN AND SILVER ALLOYS.

By P. M. Bosch.

Although the manufacturers of copper, brass, bronze, aluminum, zinc, new silver and German silver castings have reached a high degree of efficiency in their work, there are many faults yet to be overcome, and the object of this article is to offer a remedy which can, if properly used, eliminate much of the trouble encountered in the operation of the brass foundry.

Some of this trouble can be attributed to the fact that oftentimes the metal has been improperly melted; and, furthermore, many foundries use a large quantity of scrap metal in their mixtures, and as the metals used contain more or less oxygen, and as most metals absorb oxygen during the process of casting, it is advisable to utilize the services of a good deoxidizing agent. For this purpose the writer would urge the use of magnesium, or an alloy of magnesium with copper, zinc, aluminum, nickel or tin according to the mixture being worked.

An alloy of magnesium and zinc is an excellent deoxidizer for copper sand mould castings. The addition should take place only after the copper, molten ready for use, has been removed from the fire and after the well known playing has stopped. The foundryman is cautioned to add the magnesium-zinc only as mentioned above, as to add it earlier is useless and furthermore wasters or useless castings might easily be the result of such action. The addition may amount up to one and one-half per cent. In the finished copper casting only faint traces of the deoxidizer remain.

Tensile tests have demonstrated that a small addition of magnesium aluminum to the rolled copper will give very good results, as by this process the hardness and ductility of the latter is materially increased. The texture of malleable copper deoxidized with magnesium-aluminum is of extremely fibrous construction; the addition may amount up to one-half per cent. to one per cent. and should take place after the melting bath has been removed from the fire.

In the manufacture of brass, it is advisable to use a magnesium-zinc alloy, as this will give the desired color and furthermore, it will strengthen and toughen the casting, whereas the use of pure zinc alone, as now practiced in many foundries, will give the brass the right color, but it also weakens the metal. In bronze work the best results will be obtained by the use of a magnesium-copper alloy.

Pure aluminum alloys will be greatly improved by the use of a magnesium-aluminum alloy which must be added by means of graphite pincers, immediately after the melting bath has been removed from the fire. If the magnesium is added in the form of a magnesium-copper alloy, the working of aluminum alloys will be materially facilitated.

Magnesium is of excellent value as a deoxidizer of silver, new silver and argentum alloys. The following silver alloy is exceedingly tough:

Fine silver.....98.5
Magnesium 1.5

The magnesium can be added in the pure state or in the form of an alloy of 50 per cent. magnesium-silver.

In the manufacture of new silver and argentan alloys, experiments have demonstrated that magnesium will give better results than can be obtained by using any other deoxidizer. If during the process of melting and before the addition of zinc to the melting bath, manganese free from iron and carbon is added, the absorption of oxygen in the melting bath from the fuel gases is counteracted. In the melting of new silver and argentan alloys quick melting is quite necessary and a crucible shaft or pit furnace with a central flue arrangement is most suitable. Good results cannot be obtained with a blast furnace. Furthermore, it is well to note that the higher the nickel contents the more refractory are the copper, nickel and zinc alloys in themselves and for this reason the cross-cuts of the channels as well as the gates of the mould must be correspondingly larger; it is further necessary to slightly cool off these melting baths, before adding the zinc, in order to avoid the excessive burning of same and this can be accomplished by adding remnants of the same alloy. To prevent heat cracks, the clamp-screws should be loosened immediately after the process of casting and care must be taken not to disturb the mould while doing this. In any event, our readers are cautioned against using a cheap grade of magnesium, because if good results are desired it is absolutely necessary to use the best grade of magnesium.

RETINNING TINNED SPOONS.

By Chas. H. Proctor.

Sometimes a cheap grade of spoons is made from regular roofing tin. When these are blanked out and perforated the iron is exposed at the edges and it is necessary to give the article another coat of tin.

The usual whitening solution used for brass is made up by preparing a saturated solution of cream of tartar by boiling. Perforated sheets of pure Straits tin are used. The solution should be boiled several hours before placing the articles in it. A brass lined tank is best for this purpose, heated with a lead steam coil. The articles are placed in layers one or two inches deep with sheets of the perforated tin between. After boiling for 5 hours remove, wash and dry out in hot maple sawdust. This solution deposits bright if the articles are bright when immersed. A tumbled or acid dip is the usual finish. This solution may be used constantly by the addition of small amounts of cream of tartar at each boiling, and adding water to take the place of that lost by evaporation.

With slight modification this solution may be used for retinning the edges of articles cut from ordinary sheet tin. The articles are placed upon a sheet of perforated zinc, when a coating can be obtained in 15 minutes sufficient for the purpose. The deposit upon iron comes out dead white. After drying it is necessary to tumble in bran or macerated leather meal.

Another solution highly recommended for this purpose consists of

Fused chloride of tin	1 oz.
Sodium pyrophosphate	5 "
Water	5 gals.

This is used hot, the articles being placed upon perforated sheet zinc. A good rapid deposit is obtained. The finishing is done as in the other case.

The tin deposits of Alaska bid fair to be of the utmost importance. The first lode tin in that territory was found in 1903 on a tributary of Lost River about 7 miles from the sea. It showed the tin ore in a large metamorphosed acidic dike. Several tunnels have been driven, revealing veins 3 to 10 feet thick. Considerable discoveries of tin ore have been made on Cape Mountain, where a company is operating on an ore body 2 and 3 feet thick.

SOME FEATURES IN THE METALLURGY OF COPPER.

By Thomas Johnson, Jr.

(Continued from page 242, October.)

EFFECTS OF IMPURITIES ON "TOUGH" COPPER.

Although arsenic almost invariably comes under the category of impurities, it can hardly be classed as such when dealing with "tough" copper, because its presence is so often specified. Engineers (especially locomotive engineers) have found that the purer forms of copper do not resist wear nearly so well as that containing a small quantity of arsenic. Having found that these small amounts of arsenic are beneficial, it is regrettable that they cannot agree as to what particular amount is necessary. Quantities varying from 0.15 to 0.50 per cent. are specified by different engineers. The ideal "tough" copper is of course that consisting wholly or nearly so of copper and arsenic, without impurities; in fact, some of the existing specifications are so stringent as to the copper and arsenic contents that the present of other metals, except in traces, is rendered almost impossible.

Antimony is often present in "tough" coppers, and in small quantities has no ill effects. The effect of antimony when alloyed with commercially pure copper has the reverse effect to that usually attributed to it.

The following table will demonstrate the effect of small quantities of arsenic and antimony upon the tensile strength of copper. It will be observed that antimony acts very much like arsenic.

	Tensile strength Tons per sq. in.		Elongation in 2 ins.	
Commercially pure copper	13.90		49	
Copper with				
25% arsenic	15.09	15.29	50	48
50% "	15.50		46	
35% antimony	15.79	15.68	49	47
50% "	15.60		45	

Among the other impurities bismuth is the most formidable, but even this is considerably neutralized when arsenic is present, as, indeed, are most of the other impurities.

*Abstract of paper read before the Birmingham Metallurgical Society, England.

OXYGEN IN COPPER.

Among the elements by which copper is effected there is one with which that metal in the solid state is always intimately associated—that is, the familiar element oxygen. It does not, of course, exist in the copper as a gas, but has been absorbed by the copper when in a molten condition, and is present therein as cuprous oxide, Cu_2O. When oxygen or cuprous oxide is present in excessive quantities the copper is commercially useless, but small quantities, varying with the amount and character of the impurities present, are always essentially present in commercial copper, as most of the impurities exist as oxides. Even the very purest of commercial copper (electrolytic copper which has been melted and cast) contains some oxygen, certainly a very small quantity, the lowest, perhaps, being about 0.02 per cent. In very pure electrolytic copper, and I emphasize this point as all electrolytic copper is *not* very pure, there is practically no oxygen. In a sample of exceptionally pure electrolytic copper the quantity of oxygen present was 0.005 per cent., which can safely be called a negligible quantity.

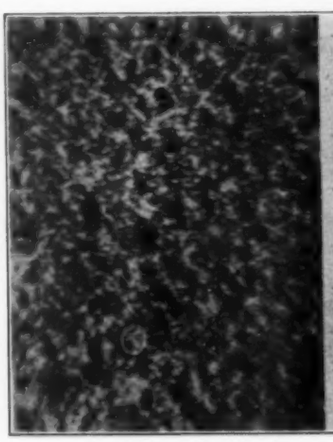


FIG. 4.
Tough copper after drawing into finished tube.

FIG. 5.
Extremely pure electrolytic copper.

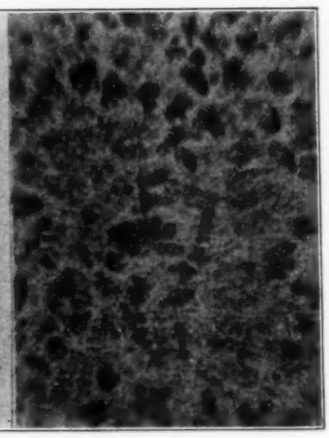


FIG. 6.
Copper containing 1.80 per cent. oxygen, or 16.02 per cent. cuprous oxide.

Now, when a current of pure hydrogen gas was passed over this copper at a temperature of about 700 degs. C. for a considerable time, and allowed to cool in this current of hydrogen, and atmospheric air subsequently allowed to pass through to remove all traces of hydrogen, no change was found to have taken place in the copper. That is to say, it retained all its virtues. It could be bent and twisted as much as before having been in contact with the hydrogen.

Now, a sample of very pure copper wire made from electrolytic copper, which was subsequently melted and cast, etc., was treated in precisely the same manner as the foregoing sample. Obviously, to be in the form of fine wire the copper possessed all the characteristic properties of that metal, but after treatment with hydrogen these properties were destroyed. In fact, the wire became intensely brittle and would not bend once without breaking. The sample was carefully weighed before and after the operation, and was found to have lost 0.04 per cent., which represents the amount of oxygen in the copper, and which oxygen had been retained since the copper had been "cast."

Now to return to the brittleness of the wire, the cause of which is unquestionably the abstraction of the oxygen. The oxygen in the form of cuprous oxide was one of the components parts of a solid body, and when that component part is removed porosity must inevitably ensue, the structure thus becomes weakened, with the result that the copper is rendered quite brittle.

A series of micro-photographs dealing with this subject of copper and its relation to oxygen was then shown.

Plate No. 5 shows the micro-structure of extremely pure copper. It is taken from the sample to which I referred a short time ago. Here the crystals of copper are roughly formed and have very thin boundaries.

Plate No. 6 shows the structure of copper containing 1.80 per cent. of oxygen or 16.02 per cent. of cuprous oxide. Otherwise it is practically free from impurities. In the structure the ground-work or matrix consists of copper and cuprous oxide eutectic. The fernlike masses are cuprous oxide.

Plate No. 7 is from the same copper from which the previous sample was taken, but in this case it has been so treated that a portion of the cuprous oxide has been reduced to the metallic state. The oxygen has, in fact, been reduced from 1.80 per cent. to only 0.36 per cent., or, to give the cuprous oxide figures, from 16.02 per cent. to 3.2 per cent. Here are shown crystals of copper, the boundaries of which are filled with the eutectic of copper and cuprous oxide.

Plate No. 8 is still a continuation of the previous specimens with the oxygen content reduced to .05 per cent., or the cuprous oxide .45 per cent. In this condition the copper was ready to receive mechanical treatment. The micro-structure here shows very large crystals of copper, surrounded by the copper and cuprous oxide eutectic, which, although the amount of oxygen is small, is clearly revealed by the microscope.

Plate No. 9 shows the micro-structure of the same sample of copper, and has undergone still another change, not in composition, but by mechanical treatment. One can scarcely realize that this is the same copper as the previous one which revealed the abnormally large crystals, but such, however, is the case, and here it will be observed that the crystals are irregularly shaped and are very small. The effect shown here is similar to the one shown earlier in the evening, except that here we are dealing with comparatively pure copper, while in the case to which I have referred we were dealing with copper carrying arsenic.

(To be concluded.)

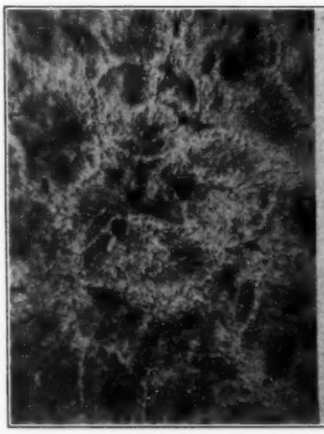


FIG. 7.
Copper containing 0.36 per cent. oxygen, or 3.2 per cent. cuprous oxide.

FIG. 8.
H. C. copper in its "cast" condition. Oxygen = 0.05 per cent.; Cu_2O = 0.56 per cent.

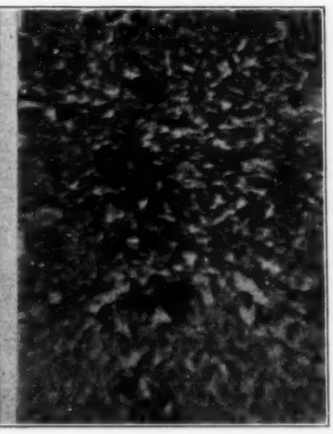


FIG. 9.
H. C. copper rolled.

REPLATING SOFT METAL WARE.

By Frederick J. Frost.

First remove all the former plating by hanging the article in silver strike solution, connected to the positive pole of the dynamo and connect the anodes with negative pole. When thoroughly stripped of silver rinse in water and immerse in a pickle composed of equal parts of hydrochloric acid and water. A couple of minutes is usually sufficient, but more time may be required on very old ware to loosen the black scale, which must be all removed. Rinse and dry.

Then polish out scratches with felt or leather buffs, using with them powdered pumice, moistened with oil, as a cutting agent. Then immerse in strong, hot potash and with a brush rub off adhering grease. Rinse, then scratch brush with a brass wire brush kept wet with bran water or beer and water or other suitable mucilagineous decoction. This operation must be well done, the hands being perfectly clean. When through the article should be bright all over. Then thoroughly scour with wet powdered pumice, using stiff bristle brushes. Rinse with absolutely clean water, then pass through strong hot potash; again rinse in clean water. The article is now ready to be struck with silver. In doing this the article must be thoroughly covered, but a too rapid deposition of metal must be guarded against by keeping the article in motion. A strong electric voltage is necessary. From the striking solution transfer the article to the plating vat without further treatment. In four hours a fairly good plate should be deposited, provided, of course, the dynamo, electric connections and solution are in proper condition, and by aid of rheostat the current has been suitably regulated.

ANTIMONY.

According to Mineral Resources the United States has good deposits of antimony, and yet in 1905 none of the metal was mined in this country. The greater portion of the ore is imported free of duty from China, although small lots have been received from Mexico. The regulus or metal is imported at a duty of ¾ of 1 per cent per pound from England, Japan, Hungary and France in the order named. The imports of metal in 1905 amounted to 4,970,247 pounds, valued at $431,228, and of crude antimony and ore 1,970,788 pounds, valued at $53,026.

BRONZE DOORS FOR THE NEW ANNEX TO THE MARYLAND STATE HOUSE AT ANNAPOLIS.

During the past few weeks there has been on exhibition in the studio of Jno. Williams, Inc., the bronze founders of New York City, the remarkably beautiful and ornate doors of the new annex to the historic Maryland State House at Annapolis, Md., designed by the architects Baldwin and Bennington. Architects, artists, sculptors and builders who have seen these doors are enthusiastic in their praise.

The design is colonial to harmonize with the period of architecture of the main portion of the building.

Copyright, 1906, by Jno. Williams, Inc.
BRONZE DOORS FOR MARYLAND STATE HOUSE.

Prominent in the centre of the doors are the obverse and reverse of the seal of Maryland. The data for the inscriptions was supplied by the Maryland Historical Society. The seal reproductions are executed in very high relief, the heraldic coloring being accurately shown in the modeling. The panel work is also in high relief but less pronouncedly undercut than the central medallions. The two folds of the door swing on pivots at top and bottom and in spite of their great weight, each can be moved easily with one finger.

The doors are 12 feet 8 inches high by 7 feet 4 inches wide. Each fold was cast in one piece, and to successfully cast a door of this great size bringing out with the utmost clearness the fine detail of the modeling in the ornamentation is indicative of the greatest skill in foundry practice.

The two wings or valves of these great doors were each cast in one piece from a solid plaster-of-paris model, this having been made from the sculptor's model. Each wing weighs 2,100 pounds, and with the 600 pounds additional metal for gates and risers feeding the mold a total of 2,700 pounds was melted. The metal was melted in crucibles and carried to the mold, where it was poured into a sand basin clamped to the mold. The sand plug being withdrawn, the entire contents were fed in this way to the mold. The iron mold or flask was in two parts. French sand only was used. Owing to the fact that much of the ornament on the doors was deeply undercut, many outside cores known to the iron molder as "drawbacks"—were used. The inside core was prepared by completely filling the mold with French sand, thus making what might be called a sand duplicate of the door; then enough of this, about 3/8-inch was cut away, and the resultant form accurately held in place formed an exact interior core, with the 3/8 inch space for the accommodation of the metal.

The metal used was United States Standard Bronze. This alloy was given the Jno. Williams, Inc. foundry by the United States Government at the time this company cast the doors of the Congressional Library, at Washington, D. C. This alloy consists of 90 per cent. copper, 7 per cent. tin, and 3 per cent. spelter. The alloy was made up of copper from the Calumet and Hecla Lake Superior Mines, Straits tin and Bertha spelter. This forms a very tenacious metal of great beauty of color, but oiwng to its toughness, is exceedingly difficult to work in the foundry.

Some of the ornament of the doors was of the utmost delicacy, but so carefully was the work molded and cast that a comparison of the finished cast with the model failed to show the slightest line lost or ornament blurred. The cast was perfect in every respect. It took six weeks' time for two molders on each of the wings.

The doors were set up complete in the foundry to test the fitting of the pivots, locks, etc., they worked perfectly and were so well balanced that the pressure of one finger was sufficient to open them. The finish is a natural bronze color, slightly oxidized.

THE OLD OLIVE GREEN FINISH.

The old olive green finish is produced by first immersing the castings in the regular acid brass dip and then roughing out the high lights with No. 100 emery.

An oxidizing solution is then prepared as follows: ½ pound of carbonate of copper is dissolved in 1 gallon of 26 per cent ammonia water. After thoroughly stirring add ½ gallon of warm water and 8 oz. carbonate of soda. The solution should be nearly cold and prepared several hours before using. The work is wired up in bunches and is then passed through the acid dip above mentioned, washed and immersed in the oxidizing solution for a few seconds or until the color assumes a dark olive green, but not black.

It is then washed and passed through boiling water to which may be added a little plater's compound. The high lights are relieved with moist pumice stone, but if they are dark enough they may be directly lacquered. If not the articles should be momentarily re-dipped in the oxidizing solution.

The lacquering should be a one part varnish and one part collodion lacquer to which may be added a little aniline green, dissolved if necessary in alcohol or fusel oil.

THE WILLIAM H. BRISTOL RECORDING PYROMETER.

In this era of rapid technical progress in all industrial and manufacturing establishments where high temperatures are employed there is an increasing demand for instruments to automatically and accurately

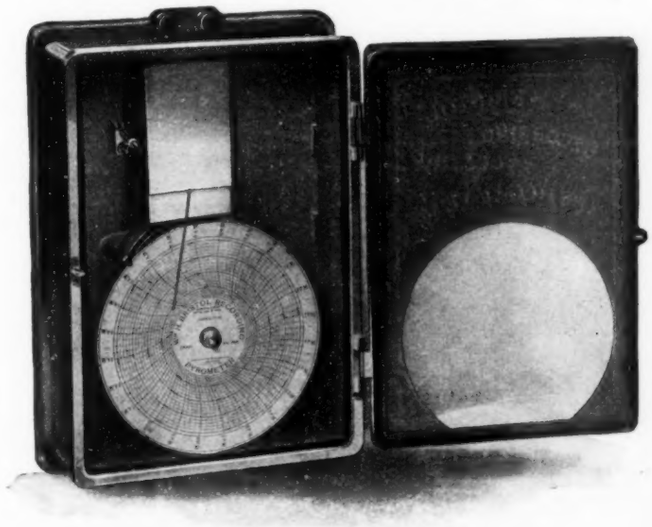


FIG. 1. THE RECORDER.

record every change that occurs. Records obtained from such apparatus make it possible to control the temperatures so that the product is perfectly uniform and most economically produced.

The recording pyrometer herein described is of the thermo-electric type, which is capable of application

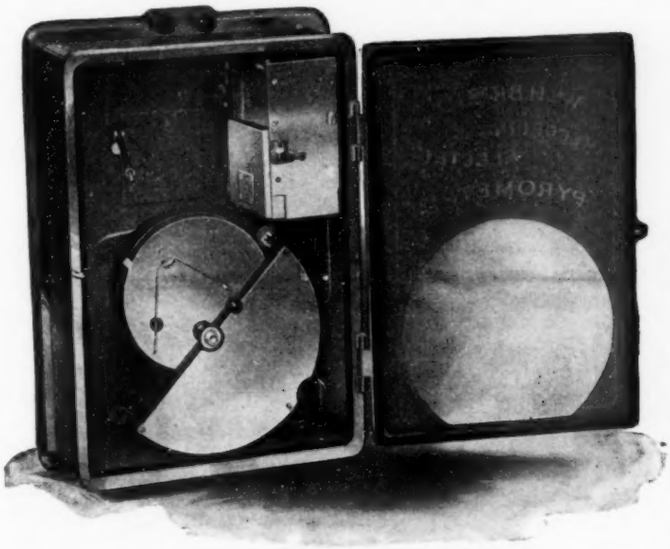


FIG. 2. RECORDER WITH CHART REMOVED.

to almost every commercial and industrial requirement.

A complete instrument consists of the following parts:

1st. The recorder, which is located at the point most convenient for observation of the records and for changing of the charts.

2nd. The thermo-electric couple, the fire-end of which is to be inserted into the space where the temperature is to be measured.

3rd. The leads consisting of duplex flexible cable, for making the electric connection between the recorder and the fire-ends.

The current of electricity produced by the thermo-electric couple, which is located where the temperature is to be measured, is communicated to the recorder through the connecting leads and actuates a galvanometer movement which is contained in the dust proof metal case shown at upper portion of Fig. 1. The galvanometer movement is made according to a special design of the Weston Electrical Instrument Company with pivot and jewel bearings for the moving coil. It is "dead beat" in its action.

The delicate recorder arm moves perfectly free and clear just in front of a chart which is revolved by a clock movement once in 24 hours or at any other desired rate.

The charts are prepared with a semi-transparent smoked surface which is so sensitive that a record

FIG. 3. SMOKED CHART WITH RECORD.

may be made upon it with a hair. The chart when applied to the instrument as shown in Fig. 1 is supported over only a portion of its surface, by the semi-circular plate shown in the lower portion of Fig. 2.

The clock movement for revolving the chart is contained in the round case behind the semi-circular chart support (see Fig. 2), and is provided with an auxiliary attachment for periodically vibrating the unsupported portion of the chart, thus bringing its smoked surface at intervals of a few seconds into contact with the pointed end of the recorder arm.

By this means the record of its position is obtained and friction is absolutely eliminated.

The series of marks made by the periodic contact of the recorder arm where the carbon is removed from the chart forms a continuous curve unless the changes of temperature are extremely rapid.

After the record of the day is completed the chart is removed from the instrument and "fixed" by immersion in a fixative solution. This solution consists of gasoline or alcohol to which has been added a small amount of concentrated fixative. After fixing,

the charts may be handled and filed away without danger of destroying the record.

Fig. 3 is a reduced photographic reproduction of a smoked chart with a record of the temperature in a lead bath which is used for calibrating these pyrometers. It is interesting to note the constancy of the temperature during the period of nearly half an hour while at night the mass of metal was cooling and passing from the molten to the solid state.

The simplicity of construction insures durability, permanent accuracy and makes the operation of the instrument an easy matter. The protecting case containing the galvanometer is hinged to the back of the recorder and in Fig. 2 is shown turned to one side.

This arrangement provides against danger of injury to the recorder arm while charts are being changed and the clock wound.

The charts, as mentioned, are prepared with a smoked surface, special features of these charts being

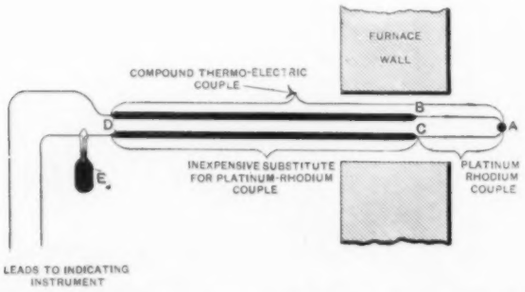


FIG. 4. APPLICATION OF PYROMETER TO A FURNACE.

that the coating of lamp black is not sufficient to obscure the graduations and that the edges and center are unsmoked.

They can therefore be conveniently handled and packed for shipment.

The couples employed for ranges not exceeding 2000° Fahrenheit are made of special alloys which are inexpensive and may be of almost any desired form or length to suit the special requirements.

For ranges above 2000° Fahr. the standard Le Chatelier platinum-rhodium elements are used.

Compound couples as illustrated by the diagrammatic sketch Fig. 4, are used to reduce the cost. The inexpensive alloys employed for the extension of the couple are such that the two secondary thermo-electric effects at the junctions with the platinum and platinum-rhodium elements neutralize each other if the temperature at these junctions does not exceed 1200° Fahr. The indications on the instrument will be the same as if the whole couple had been made of the precious metals.

Where there are varying temperatures at the cold end of the couple the mercury compensator E, Fig. 4, is used, which automatically changes the resistance of the circuit so that no correction is necessary for the working range of the recorder.

These pyrometers are being placed on the market by Wm. H. Bristol, 45 Vesey street, New York City.

The Department of Mines and Agriculture of New South Wales announces that the gold yield of this State for the year 1905 was 274,267 oz. fine, valued at £1,165,013; and that to the end of the year 1905 the state has produced 12,532,651 oz. of fine gold, valued at £53,235,286.

MAKING FLAT WARE AT THE MILL.

In these days of economy in manufacturing the effort is being made everywhere to bring the different branches of industry together, so far as this can be done advantageously, thereby cutting out freight and labor bills and waste of energy in extra handling. An instance of this combination of branches of manufacture was brought recently to our attention by the removal of the flat ware department of W. A. Rogers Company, of Niagara Falls, N. Y., to the rolling mill of the Riverside Metal Company, Riverside, N. J. In the manufacture of flat ware the scrap is said to amount to 30 per cent, which scrap is generally resold to mills which furnished the stock. If the factory is a distance from the mill it means that sheet metal has to journey all the way to the blanking shop to be blanked into knives, spoons and forks and then the scrap returned to the mill. It was to do away with this extra freight travel that the Rogers people moved to the rolling mill, where they can get their German silver for the manufacture of flat ware. When the blanks are cut out they are sent to the factory for plating and finishing.

VERDE ANTIQUE ON A FERRY HOUSE—POPULARITY OF THE FINISH.

An application of the verde antique finish to building construction was made recently in the new ferry houses of the Delaware, Lackawana and Western Railroad, West 23rd street and the North River, New York City, and when the buildings were complete the beautiful green shades were much admired. However, within a short time fire destroyed all of the beauties of the verde antique and the buildings themselves, reducing all to a junk heap. The ferry house has since been built and the Tresal Bronzing & Plating Company, 245 West 28th street, New York City, write us that they are treating the ferry houses with their acid green, producing the verde antique finish. This finish seems to be as popular as ever, for there is scarcely a month but that THE METAL INDUSTRY gets inquiries on the method of applying this verde antique. The best method of procedure has been described a number of times by Charles H. Proctor in these columns, who not only tells various platers how to do it, but is an expert verde antique finisher himself. A special verde antique lacquer is made by The New Era Lustre Company, of New Haven, Conn.

AMERICAN CADMIUM.

The Grasselli Chemical Company, of Cleveland, Ohio, and 60 Wall street, New York, have begun the manufacture of cadmium. Heretofore this metal has been supplied entirely by Germany, and the Grasselli people are the first American manufacturers to produce cadmium. The uses of cadmium in the arts are in the manufacture of sterling silver in the fusible alloys and in dentists' alloys.

Many firms do not scratch-brush their brass deposits but pass them rapidly through a slow acting bright dipping acid. This procedure produces an even color all over which needs little buffing. Arsenic should not be added to the brass bath for this method, as the deposit will dip up blackish brown but never bright. A dull deposit, if it is not burnt, dips up best.

Acid copper sulphate solutions will sometimes deposit hard and streaky when in constant use. Two oz. of transparent white glue dissolved in one pint of hot water with one oz. of nitric acid added, will produce a softer and more even deposit.

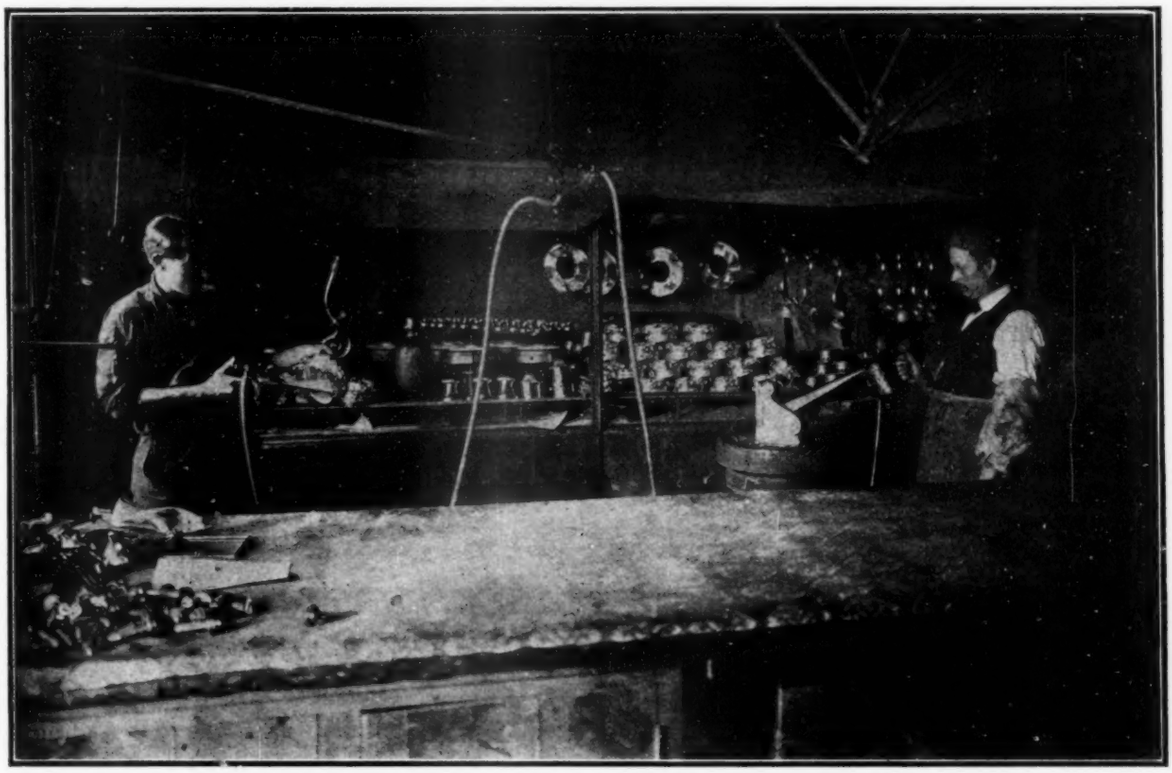
INDUSTRIAL

NEW AND USEFUL MACHINERY, DEVICES, APPLANCES AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

THE EUREKA SPRAYING MACHINE.

The pneumatic process of applying all kinds of bronzes, varnishes, lacquers, etc., has been steadily growing in favor since its introduction by the Eureka Pneumatic Spray Company, of 18-20 Chambers street, New York City, some five years ago.

In the past metal lacquering has been limited to two processes, brush and dip, both of which are undesirable except on certain articles. The first is wasteful of material and the other of time, and both are very apt to produce more or less well defined streaks. The spraying machine applies an even coating in all cases and is from three to five times as rapid as the brush. A work for which it is particularly well suited is for facing foundry cores and molds; it is also adapted to be used by molders in place of the old-time bellows. The engraving shows the machine, which is of simple and durable construction, used for lacquering brass and bronze.



THE EUREKA LACQUER SPRAYING MACHINE.

The Board of United States General Appraisers has overruled a claim filed by Hermann Boker & Company, of New York, protesting against the imposition of a 45 per cent. duty on wire composed of iron and nickel. It was maintained by the importers that the merchandise should be accorded duty at 2-10th of a cent per pound.

RED PREPARED COPPER.

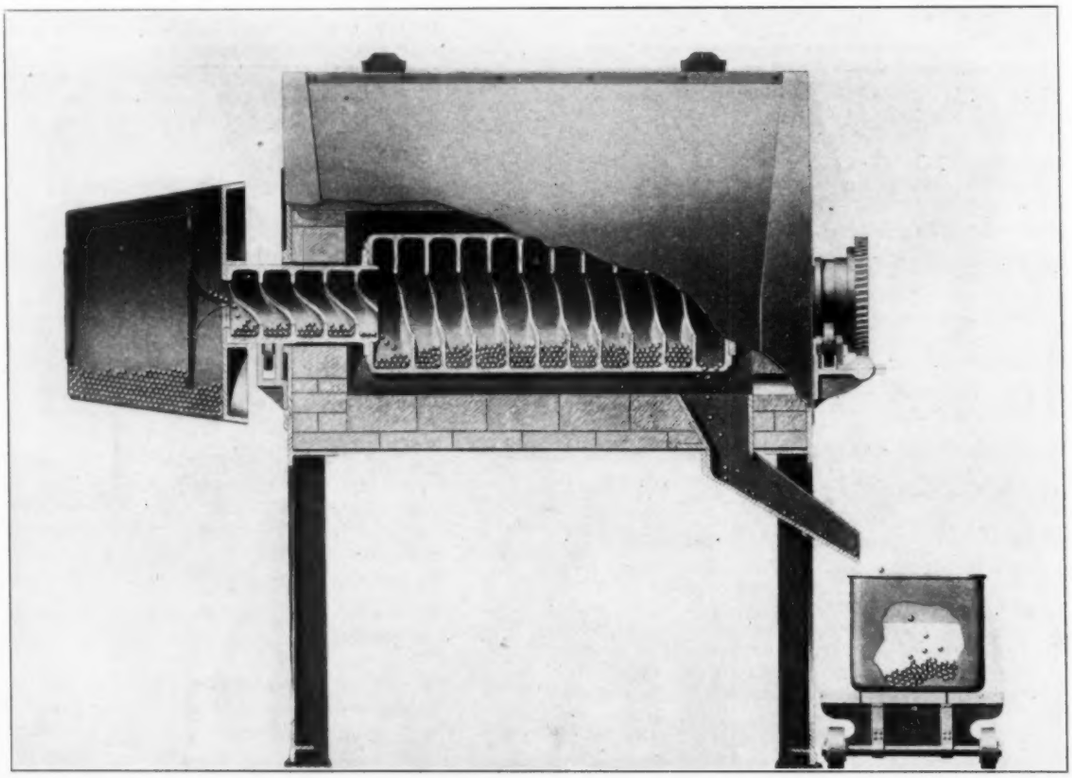
During the last 18 months the Finkell-Hachmeister Chemical Company, of Pittsburg, Pa., have met with great success in the introduction of their new Red Copper Compound for copper, brass and bronze electroplating baths. The company report that this compound has been imitated by one or two concerns and placed on the market under the name adopted by the original producers. They also say that at the price at which these imitations are sold they cannot be pure and they cannot be used successfully. Even at the increased cost the Red Copper Compound of Finkell-Hachmeister Chemical Company is cheaper than carbonate of copper and is a great saver of time and other expense.

COLD GALVANIZED SQUARES.

A recent application of the process of cold galvanizing is to carpenters' squares. These squares are manufactured in a number of different finishes, including nickel plate, royal copper and brass plate. Cold galvanizing is an inexpensive finish and the squares that were tested for six months did not rust any more than those finished in nickel plate. Royal copper lasts the best of all, though the most expensive. Zinc plated squares have a frosted appearance similar to satin finish, which is very pleasing and the manufacturers report that there is an active demand for them.

THE ROCKWELL HEATING MACHINE.

In many industries there is a demand for a heating machine in which the temperature can be regulated as desired and in which the time during which the articles are subjected to the heat can be changed as may be required. Such a machine is used for annealing, hardening, tempering or coloring quantities of similar pieces of gold, silver, bronze, brass, copper, steel, etc. The machine manufactured by the Rockwell Engineering Company, 26 Cortlandt street, New York City, permits of using any degree of heat that may be demanded by the work and also permits of having the articles subjected to the heat for a longer or shorter period as may be desired. In addition to these advantages the machine is automatic, and when once regulated requires no attention except to keep it supplied with the material to be heated. The construction will be understood from the accompanying sectional view. Extending through the furnace is a cylindrical chamber having in its interior a spiral groove. At one end is a hopper which feeds the articles to the grooves. The cylindrical chamber is slowly revolved by an electric motor placed at the opposite end of the machine. After having been heated to the desired temperature the articles fall out at the end opposite the entrance. The furnace is very simple in operation and may be heated with either oil or gas. It requires no chimney, only a hood and vent pipe. The capacity of these machines depends upon the weight, shape and character of the work. An average of 400 to 600 pounds of metal may be annealed per hour in the machine occupying a floor space of 108 x 48 inches and having a height of 80 inches.



THE ROCKWELL HEATING MACHINE.

Good judges have a high opinion of the gold resources of India. Last July the total production was 12,354 ounces.

ROBERTS CAUSTIC AND LIQUID POTASH.

By Chas. H. Proctor.

Probably one of the most important products used in connection with the electro-deposition of metals is caustic potash. Owing to its great power of saponification of heavy oils and grease, which are used in many operations in producing metallic articles which are eventually to be electroplated with various metals, its use is greater than any other substance for this purpose. It is the most essential cleansing agent in both the manufacture and manipulation of the ferrous and non-ferrous metals.

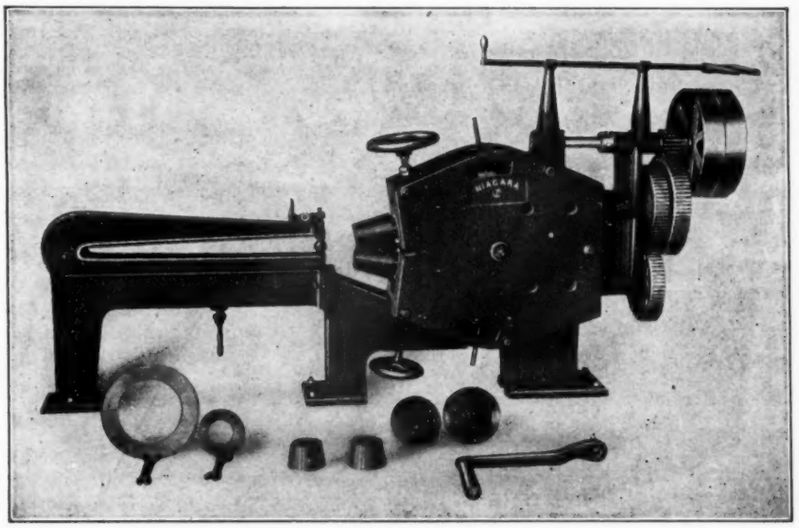
Some concerns use caustic soda; others combinations of caustic and carbonate of soda; others rock potash. In very many experiments made with various products and combinations of this nature I have found that the Roberts Chemical Company's caustic and liquid potash has given the best results. By tests made by weight according to the degree of density of solution, I have found that these two products absorb more oil and grease than any other similar compound I have come in contact with.

But of the two products the writer prefers the liquid potash in the concentrated form as it is so convenient to handle and so easy to obtain any desired degree of density. It is known that caustic alkalies absorb moisture very rapidly, especially during humid weather, and in this moist state are not so convenient to handle; but liquid potash avoids this and gives the best satisfaction.

When small brass castings are made from old castings and are low in copper it is impossible to produce a good color by dipping and it is well to tumble them in a tumbling barrel, using 2 oz. of sal soda to each gallon of water used. This hardens the surface a little when the articles are tumbled for a half-hour or more. When they are washed and rapidly passed through the bright dipping acid, a good color of the surface will be obtained.

CORRUGATING MACHINE FOR METAL GASKETS.

The accompanying illustration shows a machine designed by the Niagara Machine & Tool Works, of Buffalo, N. Y., for corrugating gaskets of light sheet copper, steel or brass. The material is first cut into discs of proper diameter by means of circle shears of the type that is suitable for cutting internal circles as the shears are also used for cutting out the center after the rim has been corrugated, unless the inside diameter is so small that the holes can be punched out. The arm in which the material is clamped while being corrugated is adjustable for discs from 3 inches to 48 inches diameter. The conical rolls are made to conform with the desired shape of the corrugations, and in width up to 5 inches. It is an important feature of the machine that both shafts are inclined, and that the angle of the shafts can be varied as may be required to give proper position of the corrugating rolls for work of different diameters, and so that the material can be pinched more or less in the inner or outer corrugations.



CORRUGATING MACHINE FOR METAL GASKETS.

The roll shafts are mounted in rocking boxes, the rear end of which is carried by yokes. Either end of the roll shafts can be raised or lowered by means of hand wheels. The inclined shafts are driven by universal couplings from parallel shafts. The gears connecting these shafts always remain in the same mesh. The illustration shows the machine with the casing that covers one side of the corrugating head removed.

SWASTIKA.

The "Swastika" is the oldest cross and one of the most ancient symbols in the world. It was known and used in prehistoric times, although it first appeared historically on coins as early as 315 B. C. To the primitive astronomer the sign was important, appearing as part of the constellation Ursa Major, and a religious significance was attached to it by the Buddhists and Brahmins who made frequent use of it on their idols The Swastika has been adopted by the Page & Baker Manufacturing Company, of North Attleboro, Mass., and 9-13 Maiden Lane, New York City, for a very pleasing series of watch fobs, stamp and match boxes, links, scarf and lace pins and teaspoons in sterling silver and enamel.

HIGHER EXPORT DUTY ON SINGAPORE TIN.

Consul General D. F. Wilber reports from Singapore that on June 1 the following higher export duty was imposed on tin, tin ore and manufactured tin, with a 70 per cent. rebate to Great Britain:

When the price of tin exceeds $31 per picul (picul= 133½ pounds) up to $32, $10 duty; on a price of $32 to $33, $10.25 duty; with a gradual increase on up to $43 to $44 per picul, a duty of $14.50 is charged. Then for every additional $1 per picul in the price, 50 cents.

The duty will be reckoned on the price telegraphed daily from Singapore. A rebate is provided on tin won from rock when it can not be obtained therefrom without picking, blasting or crushing. Such rebate, approved by the authorities, shall not exceed 50 per cent. of the prescribed duty.

On tin ore exported under such guaranties as the resident may require that it be smelted in the colony of the Straits Settlements or in the United Kingdom, 70 per cent. of the duty on tin. For tin ore exported without such guaranties, 70 per cent. of the duty on tin, plus an additional duty of $30 per picul. Above prices are Straits currency, $1 being now equal to 56¾ cents United States gold.

NEW COPPER FIND.

The recent announcement of the discovery of vast deposits of copper ore at Alanjarssnak, Greenland, and the statement that M. Bernburg, a Copenhagen merchant, is interested in the development of the newly recovered property is interesting news to the users of copper the world over, but just at present American consumers of this metal who have been paying 21 cents per pound and over for the past month would probably like to hear of a copper discovery nearer at home. Also one that was further developed.

Experiments are now being conducted on behalf of the United States Government to test a number of deposits of black sands found in the placer mines of the United States. Dr. W. H. Day is in charge of the experiments that are being conducted with a view to recover the gold and platinum from the black sands.

CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER ANY QUESTION RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

METALLURGICAL.

Q.—We would be pleased to have you advise us as to the best composition to use in making anodes for brass plating, and as to whether we could use scrap brass in the same.

A.—Brass anodes should consist of 64 parts copper and 34 parts zinc and should be cast in sand. Yellow brass scrap may be used to advantage by adding part scrap and part new metal. Two or three per cent more zinc should be added where scrap is used to make up for loss by remelting.

Q.—We are having trouble with our brass ingot. It has pits in it and is of an honey comb appearance. We are pouring it in iron molds which are heated. Can you help us out of the trouble?

A.—You are probably pouring your ingots at too high a temperature; try pouring the metal a little cooler. Common salt should always be used in making brass—2 lbs. to a No. 60 crucible will give excellent results. This should be added when the melting point has been reached, and a little more should be added just before pouring.

Q.—We would like you to inform us of the different proportions of the metals constittuing antimonial lead.

A.—Antimonial lead is a by-product of silver mining. It frequently contains much arsenic besides minute quantities of other metals. It is frequently used in the production of cheap metallic novelties. Alloys of lead and antimony can be purchased under the different grade names for several purposes. A good formula consists of

Lead	100 lbs.
Cooksons antimony	12½
Copper	1 oz.

On some grades of work where hardness is essential the antimony may be increased to 14 lbs. It is customary to melt the antimony with a portion of the lead in a separate pot, and when thoroughly fused adding the proper proportion of lead. A little sal ammoniac is used as a flux to bring up dirt and dross.

Q.—(1) What is considered the best alloy for small printing type? (2) What is the best alloy for large printing type? (3) In the alloy of 80 tin and 15 antimony can 5 per cent. of copper be succeessfully added so that the mixture can be remelted and show no separation and still run fluid and sharp? (4) What can be added to type metal and similar alloys that will in part take the place of antimony as a hardener?

A.—(1) 16 parts lead, 4 parts antimony and 5 parts tin. (2) 16 parts lead, 2 parts antimony and 3 parts tin. (3) Yes. Melt 2 parts copper to 1 part tin first; this is the hardener. Then add tin and antimony in proper proportion. (4) Arsenic is sometimes used for this purpose, but it is not as satisfactory as antimony. A little copper in the proportion of 1 to 2 ozs. in 100 lbs. of metal increases the hardness; antimony may then be reduced 2 lbs. in a 100-lb. mixture.

PLATING AND FINISHING.

Q.—I would like to get a formula for hot galvanizing. I have tried a solution with zinc and iron in it, using iron anodes. The results were not very good.

A.—No advantage can possibly be obtained by using a hot galvanizing solution or one containing iron in solution. Aluminum, especially in the form of sulphate of aluminum, proves very satisfactory, producing a brighter and denser deposit. Also by adding 10 to 20 ozs. glycerine in a 100-gal. solution, better results are obtained. Zinc anodes containing 10 per cent. aluminum give better results than zinc alone.

Q.—I send you a sample sash lift. Will you let me know if it is finished by a lacquer process? If not, how can I get it on brass and brass plated goods?

A.—The finish referred to is sometimes known as Old or Etruscan Brass, although most old brass finishes are the brush or the antique with black background and brush brass relief parts. To produce the bronze-like finish as upon sample proceed as follows: The castings should be made of a good yellow brass, acid dipped to produce a clear surface and lightly polished with a felt emery wheel using 100 or 150 emery; then cleaned, slightly dipped again and immersed in a cold solution of potassium sulphuret and ammonia in the proportion of 1½ oz. of potash and ¼ oz. ammonia to each gallon of water used. This will turn the castings a golden yellow. Now make up a second solution consisting of ½ lb. sulphate copper, ¼ lb. sal ammoniac to each gallon of water. This solution must be cold. After immersing in the first solution and washing, immerse in the second for a couple of seconds. Remove and wash in cold water when the bronze like finish will appear. Dry out in the usual manner. Scratch lightly with a fine crimped brass wire brush, using it dry. Then just relieve one or two of relief parts with dry pumice stone or very fine sand or emery paper. Lacquer with a transparent dip lacquer.

Q.—(1) The formula that I am using does not work right; it plates a good yellow color, but blisters. (2) How is this sample done?

A.—(1) You have probably added too much cyanide to your solution; this will cause blistering. Add more copper and a little zinc, or reduce your solution with water; also be careful not to use too strong a current. (2) To produce a black nickel deposit, same as sample submitted, prepare a solution as follows:

Sulphate nickel	30 oz.
Sal ammoniac	18 oz.
Boracic acid	6 oz.
Water	5 gals.

After preparing the solution add 10 ozs. sulpho-cyanide of potash. Use brass anodes and a current strength slightly weaker than that usually employed in nickel plating. The deposit may be slightly polished upon a soft buff.

Q.—(1) Please give me a good bronze solution; I want it to work on brass and iron. (2) Also a brass solution to plate yellow on iron chains.

A.—(1) For a 50-gallon bronze bath for heavy deposit on iron make up the following:

Carbonate of copper	12½	lbs.
Carbonate of zinc	3	lbs.
Carbonate of soda	5	lbs.
Bisulphite of soda	7	lbs.
Cyanide of potassium, 98%	20	lbs.
Water	50	gals.

Dissolve the soda salts in half the water and then add the copper and zinc salts and stir well. Dissolve the cyanide in the remaining water and mix the two solutions. The anodes should be copper or low brass. The solution should be maintained at a temperature near 110. (2) For producing a good yellow dissolve as much carbonate of zinc in 26% ammonia as it will take up. Add ½ oz. or less of this mixture to each gallon of solution in use, and the color will change to a good yellow if the copper and cyanide content is correct.

Q.—I am trying a new dynamo of high voltage and low amperes and am having trouble in plating gold work. The solutions are all right.

A.—Your trouble is too high a voltage, which, for your purpose, should not exceed 2½ volts. If possible place a good rheostat in the field. This will give you the necessary reduction; or you may make up a small battery which, when placed in the circuit, will reduce the voltage to 2½. Take two sheets of lead 6 x 18 inches, 1-32-inch thick. Solder a binding screw upon a corner of each sheet. Place a thick woolen cloth between the sheets and roll them up tightly. Now take a good sized battery jar and place the lead coil in it, after which pour in sulphuric acid diluted with three parts of water. Place in the circuit leading from the dynamo. This provides a voltage without variation and has proved very satisfactory in gold plating.

Q.—Are there any objections to the use of well water in brass plating and oxidizing?

A.—Well water can be used without any deleterious effects in copper, brass, nickel and many other baths, and also for oxidizing solutions, as it does not contain sufficient impurities, as a rule, to impair the working of such baths. In the preparation of baths of gold and silver the softer and purer the water the better the results.

Q.—Some time ago I moved to new quarters and cleaned all my tanks. The new solutions were made with the best chemicals obtainable, but the nickel one has a thick, greasy-like scum on it.

A.—The scum is probably due to an excess of ammonia which you have added to neutralize the bath. If this is so, it will be necessary for you to add some free acid. We would advise you to add oil of vitriol, diluted with 3 or 4 times the amount of water; add this so that at least 5 oz. of undiluted acid will be added to each 100 gals. of your nickel solution. This method shoud produce a very clear solution.

Q.—I send a small piece of tin coated with a paint or lacquer; how is it done?

A.—The color upon the sample is produced by coating the surface with a varnish known as No. 1 Copal Extra. The color is produced either by adding a small amount of asphaltum varnish dissolved in turpentine, or any of the yellow aniline colors soluble in turpentine. Add this to the copal until sufficient depth of color is obtained. The varnished tin is partly dried in a lacquer oven and then allowed to finish drying in the open air.

Q.—Can you give me a formula for oxidizing soft metal brass plated goods?

A.—If your solution is alkaline you can replenish it by dissolving ½ lb. white arsenic and 1 lb. cyanide potassium to each 5 gallons of solution you have in use. You will find a number of formulas for oxidizing solutions in recent issues of THE METAL INDUSTRY. A good one is to add 2 oz. sulpho-cyanide potassium to each gallon of a usual nickel solution made alkaline with ammonia; use anodes of zinc.

Q.—I have been informed that a new method of producing royal copper is done by dipping the article and then coloring in the usual manner.

A.—A good imitation of royal copper finish may be produced upon copper or copper plated articles by first polishing them in the usual way to obtain luster; then clean them as for plating and immerse in a solution of ½ oz. red sulphide of antimony and 1 oz. carbonate of potash in 1 gal. water slightly warm, or by boiling in a strong solution of cream of tartar. Another way is to dip in a solution of ¼ lb. sulphate of copper and the same amount of sal ammoniac in a gallon of water used hot. Immerse for a moment or two, wash and color upon a very soft wheel with a little wood alcohol and pulverized red rouge.

Q.—(1) I have a silver solution of about 90 gallons. How rich in silver must it be for a heavy deposit? (2) How will I find out how rich in silver it is?

A.—(1) About 3 ozs. of silver to the gallon if the proper proportion. (2) You will find this question considered in the article on the "Composition and Management of Silver Baths" in the August, 1906, issue of THE METAL INDUSTRY.

Q.—I desire an alloy of some kind suitable for making molds. These molds are to be used for making small castings of type metal. The alloy must melt at reasonably low temperature, say about that of zinc, yet be hard and durable enough to serve as a permanent mold for the castings.

A.—The only satisfactory alloy for making molds for casting the lead and antimony alloys consists of

Copper	87	Parts.
Zinc	10	"
Tin	2	"
Lead	1	"

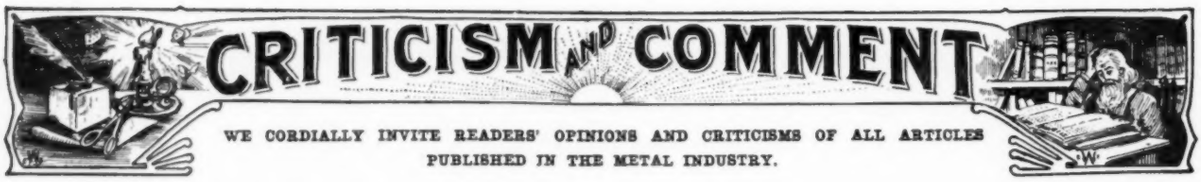
An alloy melting at as low a temperature as zinc would not prove satisfactory.

Q.—I am having trouble plating table knives. The silver deposit is so thin it will not polish.

A.—Cyanide is your only remedy to increase the rapidity of the deposit. With an increase of current you might be able to increase the thickness, but this would be only for a short time. With the increase of current an excess of silver would be reduced and without an excess of free cyanide the deposit would constantly be getting thinner and eventually only a very thin deposit would be obtained. It is customary to use a solution, for your purpose, containing 3 or 4 ozs. silver cyanide to a gallon. With 2 ozs. of nitrate of silver in cyanide of potassium the solution does not contain more than 1 oz. of metallic silver to the gallon. It is also considered bad practice to dissolve silver nitrate direct in potassium cyanide without first reducing to chloride or cyanide. Again the free acid decomposes the cyanide and forms potassium nitrate, which is injurious to the bath.

Q.—I would like a method of producing royal copper without heat.

A.—Copper plate and polish the articles, clean in the usual manner and then immerse in the following solution: ½ lb. each of sulphate of copper and sal ammoniac in 1 gal. boiling water. After the articles have been a few minutes in this, wash, dry and buff lightly, using powdered rouge and wood alcohol. This produces a good imitation of the genuine royal copper. The saltpeter method is the most successful.



HARMONY BETWEEN THE SOLUTION AND CURRENT.

To the Editor of THE METAL INDUSTRY:

A short time ago thirteen big plating tanks in my charge went wrong. It was a very serious matter to me. Something had to be done and done at once. Thinking the matter over, I came to the conclusion that if the solution is too strong for the current the result is that the deposition is slow, hard and crystalline. By this I mean that if you have a strong solution and a weak current the result is bound to be bad. One must get the solution to harmonize with the power of the machine and that is the only way to success. The law of copper deposition, as far as my experience goes, is that if you have a strong solution you must use a strong current and if a weak solution you must use a moderate current. In other words, the solution and the current must be equal and one must not overcome the other. Now as regards the tanks. The solution I was using was at 18 Baumé. I reduced this down to 16 degrees Baumé and added about one-half gallon of acid to each tank to make the solution as conductive as possible because the current I had was rather weak. The result was grand and even surprised me a little, for I had never worked a solution so low in density with a dynamo before. It taught me a lesson. Things are now running nice and smooth since I have overcome the little trouble.

I see Mr. Proctor believes in a little white glue in the solution. I always use a little Nelson's domestic gelatine, which no doubt gives the same result. In my case I have but one volt at the machine terminals. Having so small an electromotive force at hand, I had to make the solution as conductive as possible.

V. D. NASH.

EARLY BUFFING AND POLISHING EXPERIENCE AT MARE ISLAND NAVY YARD, CALIFORNIA.

To the Editor of THE METAL INDUSTRY:

Reading over THE METAL INDUSTRY reports of progress reminded me of my experience 16 years ago at the U. S. Navy Yard at Mare Island, California. I went to work there, installing polishing and buffing machinery. Previous to that time all polished work was done by hand with a file and emery cloth. A first class machinist, receiving $4 for an 8-hour day, would start, for instance, on an oar lock for sail boat or cutter with his file in the morning at 8 and have it polished and finished with crocus paper by 5 in the evening. The expense in labor alone for this particular piece of work amounted to $4. This is an actual fact.

When I started my wheels and buffs I could do ten times more work at the same rate of wages. I was cautious not to do too many; it was for Uncle Sam and not for profit. Of course this was somewhat unusual to those people at that time. Visitors from nearby towns came to see me and to find out how I could shine brass for the warships. The editors of the country papers had to come also and write columns about labor saving machinery, about emery, etc., velocity, centrifugal force and the like. I remember one party watched me for a long time manipulating a buff. Finally one of them took heart and asked me: "What kind of a stone is that?" meaning my buff. Just for fun I answered: "Oh, that is a cotton stone." "Why, you don't say so; that surely is something new."

To please them I stopped my lathe and folded my buff. "Well, I be darned; did you ever see the like of that?" But they probably went home and told their friends about the fast running cotton stone that was used to shine up the brass for the war vessels.

A few days later the master machinist told me that visitors wanted to see my cotton stone machinery. At that time I was the most hated man on the island, because I put out of work those hand polishers, that being the period when political job hunting was abolished and civil service introduced. I was even cautioned not to venture out at night. But with the growth of our new navy things changed, more men had to be employed, and an electroplating plant was soon added and attracted as much attention as the buffing did.

LOUIS GAENICKE.

NEW BOOKS.

On the Theory and Practice of Art-Enamelling upon Metals. By H. H. Cunyngham. Third edition. 5¼ x 8 inches. 188 pages. Illustrated. Published in this country by the Macmillan Company, New York City. Price $2.00.

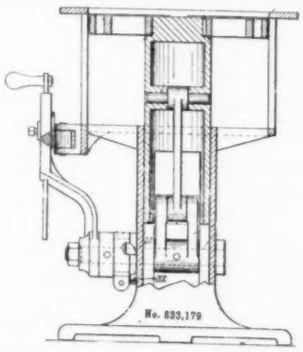
Enameling may be defined as the process of coating any material, that will bear to be raised to a red heat, with a layer of melted glass. The author considers the question from a practical standpoint, and confines his observations upon the history of enameling to such an outline as is necessary to explain its character and method of execution. After an introduction covering this, we reach the question of the choice of a style in enameling, the author laying emphasis upon the statement that the subject must be one that is worth representing and must have some meaning. Copper is the very best metal for the purpose, it being so ductile, so tenacious and cheap; and it stands such tremendous ill usage. Much attention is paid to the mode of executing limoges enamels. This process, which is the most difficult one, is mentioned with great detail. Every step in the work, from the laying out of the design and mixing the enamels, to the final firing, is treated in the plainest way. Then follows the chapter on cloisonne enamels, jewelry and imitation glass gems. Not the least valuable chapter in the book is that devoted to the manufacture of enamels. This covers the composition of enamels of all kinds and, what is of great importance, explains the actions of the most prominent ingredients. The book has been prepared by a practical man for practical men and it cannot help but be of great assistance to those who have to do with the actual manufacture of enameled metals.

A practical etcher of metals recommends the use of hydrofloric acid in etching aluminum signs, the acid being diluted to the requirements. The part of the metal not etched is protected by parafine or asphaltum.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

833,179. October 16, 1896. MOLDING MACHINE. John T. Rowlands, Racine, Wis. In this machine provision is made for supporting a flask and pattern while the mold is being formed and which will be capable of drawing the pattern downwardly from the mold, leaving the flask with the completed mold free to be removed and placed in use for molding in the usual manner. It

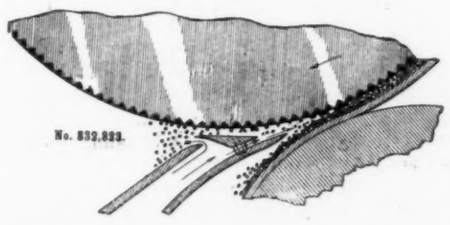


further provides for an accurate adjustment of the pattern support so that the various patterns with which the machine may be used will be moved upwardly ino the flask to the proper extent in each particular instance. The degree of drop of the pattern support may be adjusted so that the pattern can be fully withdrawn from the mold without being lowered more than is necessary for that purpose.

833,787. October 23, 1906. GRINDING MACHINE. Allen Johnston, Ottumwa, Ia. This machine is intended for grinding the dies used for rolling or otherwise forging the blades of table knife blanks having a "twist."

833,811. October 23, 1906. MULTIPLE PUNCH. L. H. Vold, Westfield, N. J., assignor to Wm. Sellers & Co., Inc., Philadelphia, Pa. This machine automatically moves the work the desired space, and also automatically controls a punch or series of punches, so that the desired punch or series of punches may be rendered operative.

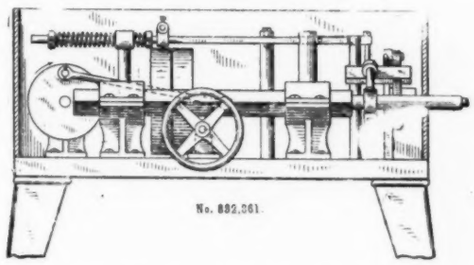
832,823. October 9, 1906. MAGNETIC ORE SEPARATOR. Henry H. Wait, Chicago, Ill., assignor to International Separator Company, Chicago, Ill. The object of this invention is to provide apparatus for the separation of magnetic materials from a mixture in the presence of water or other fluid. The material to be separated is carried by a stream of water through a magnetic



field where it is acted upon by the flux and a feature of the invention lies in the method of preventing non-magnetic particles from being carried along by the main stream past the divider plate and so reaching the space reserved for the attracted particles.

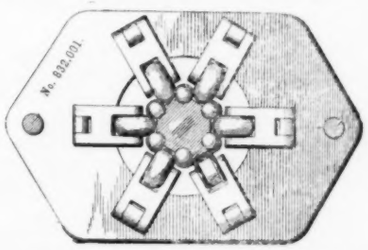
830,051. September 4, 1906. APPARATUS FOR THE ELECTROLYTIC EXTRACTION OF METALS. C. F. Carrier, Jr., of Elmira, N. Y., assignor to the Elmira Electrochemical Company of the same place. This invention relates to the electrolytic extraction of metals which are higher than the electrolytes from which they were separated. The device is simple in design and is said to be effijcient in opration.

832,861. October 9, 1906. CUTLERY POLISHING MACHINE. Charles L. Joy, New Haven, Conn. This machine is so constructed that all of the important moving parts except the work holder are located at one side of the polishing wheel so that they



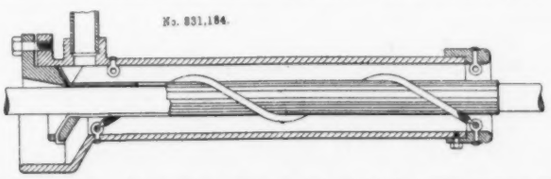
can be covered and fully protected from the dust flying from the wheel. The machine is automatic in its operation and when the knife support has reached the highest point all of the moving parts except the polishing wheel are automatically brought to the state of rest, when the finished knife is removed and replaced by another.

832,001. September 25, 1906. TUBE CORRUGATING MACHINE. Emil R. Stasch, Corning, N. Y. This machine provides a traveling mandrel and corrugating rollers arranged to traverse the



length of the tube or pipe to be corrugated. The invention also provides means by which the upper supported end of the tube may be crimped or tapered to correspond with the corrugations. The drawing shows the construction.

831,184. September 18, 1906. REFRIGERATING DEVICE FOR THE HOT METAL IN THE PRODUCTION OF RODS FROM MELTED METAL. Adam H. Pehrson, Stockholm, Sweden. This device provides



for the rapid refrigeration of a metal of high temperature when in motion, especially of metal rods or the like, produced directly from melted metal which is drawn out through a mouthpiece and cooled.

833,640. October 16, 1906. MUFFLE OR FURNACE FOR ANNEALING. Alfred Smallwood, assignor to the Incandescent Heat Company, of London, England. This furnace is intended for annealing tubes, sheets, rods and other metal articles. It consists of an annealing chamber, and a combustion chamber arranged between the fire grate and the annealing chamber. This arrangement insures more perfect combustion of the gases in their passage to the annealing chamber and at the same time the surrounding lining of the annealing chamber is made incandescent throughout, by which a more effective distribution of the heat is obtained.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Johnstown Foundry, Machine & Car Company, of Johnstown, Pa., has been sold to Geo. P. Guppes & Son.

William Durst, manufacturer of brass goods, of 4 Water street, Brooklyn, has orders to keep him busy until February, 1907.

The Camden-Anchor Rockland Machine Company, builders of gasoline engines, are erecting a large factory at Camden, N. J.

The Vulcan Detinning Company has just completed an addition to its plant at Sewaren, N. J., which will increase its capacity one-third.

The Partamol Company, 605 Broadway, New York, are manufacturers of a parting compound which is extensively used in brass foundries.

The foundry of the Golding Manufacturing Company, Franklin, Mass., which was damaged by fire about one month ago, is now in full operation.

The sterling department of Factory "E" of the International Silver Company, Meriden, Conn., has moved into their new building, where it has a very finely equipped plant.

The Charles E. Sholes Company, of 164 Front street, New York City, have become the selling agents for the products of the Roberts Chemical Company, of Niagara Falls, N. Y.

The E. D. Jones & Sons Company, of Pittsfield, Mass., have prepared plans for an addition to their foundry at a cost of $15,000. The new work will be of steel, concrete and brick.

The Panama Canal Commission has lately been buying a lot of foundry supplies and one of their orders included four casks of crucibles made by the Waterbury Crucible Company, Waterbury, Conn.

The Uco Manufacturing Company, of 2436 Brown street, Philadelphia, Pa., are placing a new valve on the market. It is intended to allow for rapid drainage of the piping that is cut off by the valve.

The Rockwell metal melting furnace is taking a few trips abroad, the company reporting that among their recent sales was one furnace each to the Governments of Mexico, Venezuela and Argentina.

The Miller Electric Company, of 20 William street, Newark, N. J., contemplate going into the plating supply business shortly, and are now negotiating for property in which they can manufacture the goods.

C. W. Leavitt & Co., St. Paul Building, New York City, announce that they can quote competitive prices on antimony. The market for spot shipment in large lots is from 24 to 25 cents, according to brands.

Good progress is now being made in the construction of the new Waterbury Rolling Mills, Incorporated, located on the Watertown road, at Waterbury, Conn. The mill is expected to be in operation before many months.

The Badger Brass Works, of Kenosha, Wis., have opened an Eastern factory at Eleventh avenue and Thirty-sixth street, New York City, where all orders for repairs and extra parts from territory east of Pittsburg should be sent.

The latest reports on the progress of the new tube mill of the National Conduit & Cable Company, at Hastings, N. Y., are that the foundations and structural work are well along and that much of the machinery has been ordered.

The Globe Manufacturing Company, of Battle Creek, Mich., makers of nebulizers, vibrators and electric air pumps, are building a three-story extension to their plant. The company will handle commercial plating in copper, nickel and zinc.

The California Artistic Metal & Wire Company, of San Francisco, Cal., have been awarded the contract for all the ornamental iron work for the new building about to be erected by Hale Brothers, on Sixth street. The contract amounts to $20,000.

Since the Atlas Machine Company, of Waterbury, Conn., was organized they have been doing a very successful business, even having more than they could attend to. The company now occupy all of the old shop of Cross & Spiers, at 35 Canal street.

The Glacier Metal Company, of Richmond, Va., makers of babbitt metal, are sending to the trade a sample of their souvenir soap. The advertisement is placed on each cake in such a way that it will remain until the last vestige of soap has been used.

The britannia metal perfected by A. E. Hobson, of Meriden, Conn., is now being used satisfactorily in several factories of the International Silver Company. Mr. Hobson says that it casts better and is more workable than the ordinary britannia.

The Russell & Erwin Manufacturing Company, New Britain, Conn., are putting on two additional stories to buildings Nos. 21, 22 and 23, and raising building No. 24 one story. They are also erecting a new brick and steel one-story building for japanning.

The Warner Instrument Company, of Beloit, Wis., manufacturers of cut-meters, tachometers and automobile indicators, are erecting a large plant which will be ready in the spring. The building will be steel and concrete and will be modern in every way.

The P. McLaughlin's Sons Company, of 230 North Twelfth street, Brooklyn, N. Y., are making large extensions to their plant, to facilitiate the increased business. They report a great influx of orders, and their outlook for this season is most promising.

The William B. Durgin Company, of Concord, N. H., have bought outright the business of Goodnow & Company, formerly Goodnow & Jenks, manufacturers of high grade hollow ware. The sterling silver wares of the Durgin Company are well known to the trade.

The H. R. Ives Company, of Montreal, Canada, are very busy in their art metal work in iron, bronze and brass. This company did all the art metal work for the King Edward hotel in Toronto, the C. P. R. hotel at Winnipeg, and similar work in Toronto, Ottawa and McGill universities.

The William H. Perry Company, 288 Dyer street, Providence, R. I., buyers and sellers of iron and metals, have bought the quarters of the Pettis Company, in the same business, at 103 Harris avenue, where the Perry Company will make their headquarters, closing up their Dyer street quarters.

Since the French Manufacturing Company, of Waterbury, Conn., started in business but last April, they have had orders enough to keep their mill running overtime. Their specialty is seamless tubing in small sizes from ½ inch o. d. down. They draw it in brass, copper and different alloys.

O. J. Mousette, manufacturer of the Monarch crusher and puiverizer, at Driggs avenue, corner North Tenth street, Brook-

lyn, N. Y., has recently placed an order for his Style No. 2 machine for the British Government. The order was placed through the firm of J. W. & C. J. Phillips, of London.

The new building of the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has been finished and will be used for their press department. It is equipped with the latest appliances, including an electric traveling crane, and the company are now in a better position to take care of this branch of their business.

The Syracuse Aluminum & Bronze Company, of Syracuse, N. Y., have purchased the brass and aluminum business of the National Car Company, of Rochester, N. Y. They have quadrupled the capacity of the Syracuse plant and have just completed what is one of the largest core oven equipments in a brass shop.

The Orleans Metal Bed Company and Hanna & Kaimbach have combined under the name Orleans Metal Bed Company, Ltd., of New Orleans, La., with a capital of $75,000. The new company are the largest manufacturers of metal beds south of the Ohio and Potomac rivers. The new concern has contracted for an entirely new and model plant.

M. L. Barrett & Co., of 219 Lake street, Chicago, Ill., announce that good results are assured by using their lacquers, which are sold under the trade mark of "Swastika." The lacquers are adapted for polished and scratched brass metal work, oxidized copper work, chandelier and gas fixture finishes and all the rest of the finishes which are put on metal goods.

A recent break in the bank of the canal of the new Milford Power Company inconvenienced a number of manufacturing plants of Waterbury, Conn., and vicinity, even leaving the city without light and power. The Scovill Manufacturing Company, of Waterbury, came to the rescue by permitting the use of their electric plant at night for the lighting of the city.

The new building of A. H. Wells & Company, manufacturers of tubing, at Waterbury, Conn., is nearing completion and will be ready for manufacturing purposes by the middle of December. This will increase their output 25 per cent. The company has had to build more room nearly every year for the last sixteen years. They manufacture special sizes of seamless drawn tubing.

The Risdon Tool Works, the incorporated successor of S. A. Risdon, are now settled in their new shop at 63 Canal street, Waterbury, Conn., where they manufacture dies, models, light machinery and tools, making a specialty of sub-press dies. They have put in additional machinery since they have moved and were incorporated under the laws of the State of Connecticut for $15,000.

The building of the new rolling mill of the Michigan Copper & Brass Company, of Detroit, Mich., is all closed in and a good part of the foundations for the engine and rolls is also in place. Some of the machinery has been received. The company expected to start their plant in January, but on account of a scarcity of cars due to the tremendous prosperity in all lines it may be later before the new mill is in operation.

The City of Chicago has its own brass foundry and manufactures all brass fittings in connection with the Water Works Department. The advisability of installing an iron foundry is now being discussed. The City of Chicago has a repair shop, in which it does all its own repair work in connection with hydrants and valves, pumping engines and bridges. It also manufactures valves and hydrants. U. H. Shaw is the engineer in charge.

Since moving from New Jersey to Stamford, Conn., which they did a few years ago, the Celluloid Zapon Company report that they have twice the equipment they had in New Jersey and that business has increased to such an extent that their output is 150 per cent. greater. The company are at present erecting a new building. Among their products for metal works are lacquers. They have opened a New York office at 310 Fourth avenue.

The whole of the plant of the Dominion Henderson Bearings, Limited, is now installed in the premsies bought by the company at the corner of Queen and Clifton streets, Niagara Falls, Ont. J. Dove-Smith (late of the Canada Foundry Company) was appointed general manager on the reorganization of the company. F. E. Lauer, who did such good work with Allis-Chalmers-Bullock, Montreal, has charge of the plant and factory, while the accounting department is in the hands of J. E. P. Rothwell.

The Seymour Manufacturing Company, Seymour, Conn., assert that they use no scrap in the manufacture of their nickel anodes, and as they buy nickel in large quantities for the manufacture of German silver they are in a position to make the best, They guarantee the per cent. of nickel contained in the Seymour anode. For alloying they use both tin and iron, believing that while tin increases the cost, it makes a whiter plate. The company are now putting in their own laboratory and will have their own chemist.

The Benedict & Burnham Manufacturing Company, of Waterbury, Conn., makers of brass and copper products, has purchased a tract of land adjacent to its plant. The property has a frontage of 160 feet on Benedict street and 244 feet on Jewelry street, and it borders on the Naugatuck River. The acquisition will give the company additional riparian privileges of value and will provide room for the expansion of its plant. The company is now making improvements and extensions involving expenditure in the neighborhood of $100,000.

The Riverside Metal Company, of Riverside, N. J., are working on the installation of a new 2,000 horse-power boiler equipment with a corresponding increase in engines. The new rolling mills, consisting of two sets of three high rod mills and two sets of 24-inch plate mills, are at the present time in course of erection on the ground. The ground has been surveyed for the erection of a new foundry building 100 x 200 feet, as well as for a new melting shop, and a large shed for metal storage. All the work will be completed by February next.

The firm of Waller & Renaud, consulting chemists, of 157 Front street, New York City, are prepared to give advice to platers and manufacturers with regard to the correction of plating solutions, the preparation of new colors, lacquers and finishes, the utilization of waste products, reduction of manufacturing costs, etc. The firm say they have the largest and best equipped chemistry and assay laboratories in New York City and are prepared to make analyses and to conduct experiments and tests in matters pertaining to electro-plating and metal industries.

The Eastern office of The Dow Chemical Manufacturing Company, located at 366 Fairfield avenue, Bridgeport, Conn., in charge of George L. Wallace, reports among its recent sales plating dynamos to the Turner & Seymour Manufacturing Company, Torrington, Conn., and the Bryant Electric Company, of Bridgeport, Conn. The machines were of 1,200 amperes and tests of them have been very satisfactory. The business of the Dow Eastern office has increased to such an extent that the agent is already looking for new quarters which will give them five times their present space.

Less than a year ago the Convertible Metal Manufacturers started business in a loft in Greenpoint; they have since built a factory of four stories at West and Green streets, Brooklyn, N. Y. Their equipment embraces all the most modern machinery for doing this kind of work. They are working night and day on electric fixtures and electroliers, besides their other branches, such as metalizing figures of all kinds. At the present time they are furnishing some of the largest buildings in New York City A point considered of great advantage to architects and builders is that they can supply fixtures at almost half the cost of solid metal and yet obtain wearing qualities and finish equal to the solid.

Owing to increasing business, the Amesbury Brass & Foundry Company, of Amesbury, Mass., has found it necessary to erect a new foundry. Work on the new building, which is to be of cement, monitor roof, etc., is progressing very rapidly, the foundation being practically complete. It is to be thoroughly equipped with all new modern furnaces, moulding machines, etc., and will accommodate ten moulders. This company during the past year has turned out brass and bronze castings, in fact,

automobile fixtures of every description, and has met with remarkable success. With the added facilities they will double their production the coming year. The foundry is in charge of James H. Robinson, who is well known as an expert foundryman.

Since the Meriden Machine Tool Company, Meriden, Conn., have reorganized and begun actively to manufacture forming lathes, they report that they have had orders ahead for all the machines they could sell for 1906. They have been placing a number through Manning, Maxwell & Moore, of New York City. The Meriden Company have recently improved their factory equipment by putting in what is known as the Humphrey arc light made by the General Gas Light Company, of Kalamazoo, Mich. The light consists of four gas mantels in a cluster with an overhead reflector by which a fine bright light is thrown over the shop. Four hundred and fifty of the lights were recently put in the mill of the Coe Brass Manufacturing Company, of Torrington, Conn.

FIRES

The machine shops and brass foundry of the Carse Ship Building Company, of San Pedro, Cal., was destroyed by fire September 19. The company will put up a similar plant at San Diego at a cost of $70,000, and later may rebuild the San Pedro works.

On October 16 the plant of the Western Foundry Supply Company, East St. Louis, Ill., was completely destroyed by fire. The company will build another plant as soon as possible and expects to be in operation in a very short time. In the meantime materials are being secured from the East and the company is filling orders promptly.

INCORPORATIONS

The Columbus (O.) Lead & Baryta Company has been incorporated with a capital of $12,000.

The St. Louis (Mo.) Tin & Sheet Metal Company has been incorporated with a capital of $100,000.

The Lyster Sheet Metal Company, of Philadelphia, Pa., has been incorporated with a capital of $100,000.

The Precious Metals Recovery Company, of Denver, Colo., has been incorporated with a capital of $150,000.

The Sedgwick Zinc & Lead Company, of Phoenix, Arizona, has been incorporated with a capital of $250,000.

The Granite Mountain Lead & Zinc Company, of St. Louis, Mo., has been incorporated with a capital of $25,000.

The Contractors' Casting & Machine Company, of Buffalo, N. Y., has been incorporated with a capital of $50,000.

F. L. Ellis & Son, of Milldale, Conn., have incorporated with $50,000. The company manufacture hardware and stamped metal goods.

The Western Sheet Metal Works, of Seattle, Wash., has been incorporated by Thomas Wood and George K. Gilbert, with a capital of $6,000.

The Fahrig Metal Company, of New York City, has been incorporated with a capital of $200,000 by Louis L. Haggin, Robert A. Shailer and Benjamin Hurd.

The Worcester Metal Goods Company, of Worcester, Mass., has been incorporated with a capital of $30,000. The president is Arthur Flagg, and treasurer Walter D. Grant.

The American Metal Company, of New York, has increased its capital from $2,000,000 to $3,000,000. This company is one of the largest dealers in copper and other metals in the world.

The A. G. Southworth Company, of New York City, has been incorporated with a capital of $100,000 to manufacture motors, engines, etc. The incorporators are J. W. Sutton, A. G. Southworth and L. R. Southworth.

The MacPhail Flask & Machine Company, of Chicago, Ill., has been incorporated with a capital of $50,000 to manufacture foundry supplies and equipment. Incorporators are James P. Thomas, Gladys L. Eastman and R. B. MacPhail.

At the annual meeting of the American Zinc, Lead & Smelting Company, held in Portland, Me., it was voted to reduce the capital stock from 100,000 shares of a par value of $2,500,000 to 50,000 shares of a par value of $1,250,000.

The G. & I. Company, of Wallingford, Conn., has been incorporated with a capital of $50,000, to engage in the manufacture of articles made of iron, brass and other metals. The incorporators are Ralph T. Ives, Harry G. Ives and Charles I. Parmelee.

The Michigan Screw Company has been organized with a capital of $100,000 for the manufacture of automobile and gas engine specialties, with R. E. Olds as president, M. R. Potter secretary and treasurer, Hugo Lumberg, formerly of the Detroit Screw Works, manager, and W. M. Roberts, of the same company, sales manager. The stock is all subscribed, the building has been purchased in which to locate the plant, and orders have been placed for the machinery.

The Owen C. Hassler Company, of Chicago, Ill., has been incorporated, and they have moved to 565 W. Fullerton street, of that city. The old co-partnership is dissolved and Fred A. Connor has bought out the interest of O. C. Hassler and is president of the corporation, and M. Hautman secretary and treasurer. Mr. Connor has for a number of years made a special study of polishes, endeavoring to eclipse all metal polishes on the market, which he believes he has done with his brand called "Albright."

PERSONALS

Fifty-two years steady employment by one manufacturing concern is a record of which both employee and employer may feel proud. This, however, is the actual record of John Gilbert, a lathe hand employed by the Russell & Erwin Manufacturing Company, New Britain, Conn. Mr. Gilbert turns hubs in iron and brass.

J. W. Pilling has resigned as assistant superintendent of the Seymour Manufacturing Company, Seymour, Conn., and H. M. Carpenter has taken his place. Mr. Carpenter is a practical man, having entered the Seymour Rolling Mill as a boy and worked his way up.

Charles J. Caley, chairman of the American Brass Foundrymen's Association and general superintendent of the Russell & Erwin Manufacturing Company, of New Britain, Conn., is enthusiastic over the prospects of forming the American Brass Founders' Association. He has outlined several plans to put in operation when the association holds its first meeting at Philadelphia next May.

A. M. Sargent has become general manager of the Roberts Chemical Company, of Niagara Falls, N. Y., in place of S. D. Benoliel, who will engage in business in New York.

Mrs. Frances A. W. McIntosh, formerly advertising manager of the Standard Tool Company, Cleveland, Ohio, and more recently connected with the advertising department of *Power*, New York, has taken charge of the publication department of the Norton Company, Worcester, Mass.

F. J. Wooster, formerly connected with the Waterbury Brass Company, Waterbury, Conn., has become superintendent of the Cheshire Brass Company, of West Cheshire, Conn.

PRINTED MATTER

"The Silent Partner," the house organ of the Globe Machine & Stamping Company of Cleveland, O., for October, is worth reading; send for a copy.

Gold Dye.—Leaflet. The New Era Lustre Company, New Haven, Conn., gives a description of their gold dye and the direc-

tions for using it. The company assert that they are the only successful manufacturers of this product, which is used extensively in giving a golden color to brass goods without the use of gold.

GRAPHITE AS A LUBRICANT.—This booklet by the Joseph Dixon Crucible Company, of Jersey City, N. J., is more than a mere piece of advertising literature. The information presented has been secured from scientific authorities and practical men, and cannot but prove to be of the greatest value to all those interested in the question of lubrication. The edition just to hand, the tenth, contains much new matter of both a scientific and and practical value.

RIDDLES.—S. Obermayer Company, Cincinnati, Chicago and Pittsburg. The new "Rockwell" riddle of the above company is much stronger and has greater wearing qualities than any riddles heretofore placed before the foundry trade. Its principal feature is that where the rims and liners lap, a strip of galvanized iron is bound securely over them, thereby preventing these joints catching and breaking when coming in contact with other objects. Patents have been applied for on this riddle.

AMMETERS AND VOLTMETERS.—Pamphlet. Louis M. Pignolet, 78 Cortlandt street, New York City. These instruments are of the permanent magnet type, and have the high accuracy and equal scale divsions of that type. Each instrument is specially calibrated and its scale is made by hand. The magnets are of imported special steel and are carefully treated to insure permanency. The instruments have jewel bearings, carefully ground hardened steel pivots, and embody improvements fully protected by patents. They are all guaranteed.

STEAM TRAPS.—Pamphlet, 30 pages. Joseph Dixon Crucible Company, Jersey City, N. J. This is a valuable illustrated description of the several varieties of steam traps written by the well-known expert steam engineer and author, W. H. Wakeman. The steam trap is not an expensive luxury only to be used by those having large capital and large plants; it is an economical part of a steam outfit and should find a place in every plant using steam for heating or drying purposes. A study of the booklet will repay all those interested in the question.

BEDSTEADS.—Catalogue. Coburn Trolley Track Manufacturing Company, Holyoke, Mass. The iron and brass bedsteads shown by this company in a handsome catalogue are made to match the rest of the furniture in appearance. The posts, top and bottom rails are made of steel tubing covered with various hard woods such as quartered oak or mahogany veneer. The corners are cast brass and the rods of seamless brass tubing. It is guaranted that the veneering will neither crack nor peel off. In line with the beds is a clothes tree for either hotel or private bedrooms.

GAS AND ELECTRIC PORTABLES.—Catalogue No. 28. Goodwin & Kintz Company, Winsted, Conn. Several new designs of gas and electric portables have bene placed on the market by this company. In their brass candlesticks for either gas or electricity all the ornamentation is hand wrought and of fine workmanship. These may be used in connection with silk or glass shades. The lamps are finished in antique green or brass with black relief. The stands are finished complete with all electric attachments including shade, bulb, wire, sockets, etc. Other patterns are finished in brushed brass and oxidized black.

METAL MARKET REVIEW

NEW YORK, November 3, 1906.

COPPER.—Standard copper in London has made another high record, and the speculative market there has been very active. Opening at £92 10s., prices advanced to £103 on the 17th, and with the general disturbance in speculative markets, owing to the action taken by the Bank of England, prices for standard warrants declined and the market closed at £97 2s. 6d. for spot copper, showing a net advance for the month of about £5 per ton and a decline from the highest point of about £6 per ton.

In the New York market prices have been gradually pushed up by the persistence of buyers, and from 21 cents quoted at the close of last month prices have reached 22½ cents for Lake and Electrolytic, while some special brands cannot be had under 22¾ cents, and this for deliveries running over the first four months of next year. At the close we hear that C. & H. copper has been sold at 22½ cents for up to March delivery. The market to-day is very strong, with very little outside lots of spot copper obtainable. The market for nearby deliveries is entirely nominal and for early next year we are quoted 22¼ to 22.50 for Lake and Electrolytic. Casting brands, 21¾ to 22.

TIN.—The London market has been very active, and bull operators were able to push spot tin up to £200, the higher rates for money had their effect on this speculative article and prices had to give way, the market closing more or less unsettled at £192 12s. 6d., a decline of about £2 below the opening and of over £7 from the highest price reached.

The New York market has been held in check by stocks of tin held and carried here for London account, and prices generally have ruled below the cost of importation. The shipments from the Straits for the month were 710 tons larger than same month last year, and for the ten months the shipments increased 533 tons, while consumption for the same period increased 2,400 tons. The total visible supply is the lowest we have had for years, being only 11,162 tons, against 12,209 tons a month ago, 12,812 tons October 31, 1905, and 13,451 tons on December 31, 1905. The consumption this month is estimated at 3,600 tons. The market closes steady, 43 cents for 5 and 10 ton lots, 43¼ cents for smaller lots.

LEAD.—The London price of lead shows a net advance for the month of 10s. per ton. Lead touched £20 on the 11th of the month and closed at £19 2s. 6d. In New York prices have held steady. The Trust has no fixed price, but is shipping lead at the old price of 5.75, while the outside market is about 5.95 to 6 cents for spot carloads.

SPELTER.—London prices have ruled steady, opening at £27 10s., advanced to £28 7s. 6d. and closed at £27 15s.

The New York market for spelter has held fairly firm at from 6.20 to 6.30, New York delivery, with St. Louis market quoted at 6.15 to 6.20. The demand is good and consumers can buy deliveries at their city at very close to the St. Louis market quotation.

ALUMINUM.—The demand holds good and the leading interests are still months behind on their deliveries. Prices have been advanced 1 cent per pound on ingot and 2 cents per pound on sheet. All descriptions of scrap aluminum are being eagerly collected and command a big price. New metal brings from 37 to 40 cents, according to quality, and scrap from 10 to 12 cents per pound for clean turnings, while new clippings are worth 31 cents, with good cast and old sheet scrap aluminum worth 26 cents per pound.

SILVER.—The London silver market has been very active and prices have reached the highest point in years. There has been a big increase in the demand from India and China, and apparently there has been or is an actual scarcity of the white metal. London opened at 31 11-16d. and closed at 32 9-16d., with the New York price up to 70⅝ cents.

SHEET METALS.—Sheet copper has been advanced another 2 cents per pound during the month, making base price 27 cents. The sheet brass and brass seamless tubing have been arranged on a new basis of discounts as published on another page.

OLD METALS.—The market has been very active, and dealers have had a good month of it, the 6 per cent Bank of England rate affected their market just the same as it did Wall Street and prices since then have not been quite so strong, in fact there has been quite a setback, but at the close the market is getting along again, with a better business doing all round. Prices generally are higher than one month ago.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 30 cents per line, 4 lines one dollar, for each insertion. Answers sent in our care will be forwarded.

METALS AND EQUIPMENT FOR SALE

FOR SALE—5 to 10 tons prime remelted SPELTER; also 5,000 pounds TERNE METAL. Quotations upon application. Address P. McLAUGHLIN'S SONS COMPANY, 230-236 North Twelfth street, Brooklyn, N. Y.

FOR SALE—Job plating shop doing all kinds of work. One of the oldest in Western New York. City, one of the finest, with a population of 200,000. Information upon inquiry. Address OLDEST, care THE METAL INDUSTRY.

FOR SALE—One (1) Journal Bearing Lathe in perfect condition. Built by John Evans Sons. Will send photo copy to anyone wishing such a machine. Address LATHE, care THE METAL INDUSTRY.

FOR SALE—Electro-Plating plant in good condition. Tanks 500 gallons capacity. Nickel and Copper Solutions. Address L. C. WHITE, 225 Beecher avenue, Detroit, Mich.

FOR SALE—Factory well equipped to manufacture all kinds of metal novelties; gas and electric portables, fixtures, etc. Running now, employing 12 men. Plenty of orders in books and plenty of stock to complete them. Show rooms in New York and other large cities. Good reasons for selling. Address REASONABLE, care THE METAL INDUSTRY.

FOR SALE—One new Speed Lathe. Address SPEED LATHE, care THE METAL INDUSTRY.

METALS AND EQUIPMENT WANTED

WANTED—1,000 to 5,000 pounds of BRASS and COMPOSITION TURNINGS. Also 1,000 to 5,000 pounds of heavy YELLOW BRASS, LIGHT BRASS and BRASS WASTE. Address P. McLAUGHLIN'S SONS COMPANY, 230 North Twelfth street, Brooklyn, N. Y.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 32 Fulton street, New York City.

WANTED—One or two good second-hand MONITOR LATHES. Address with description and price, GIBBS, 415 Fifth avenue, Chicago, Ill.

SITUATIONS OPEN

IMPORTANT SITUATION

A YOUNG MAN WITH GOOD TECHNICAL EDUCATION, FAMILIAR WITH BRONZE WORK, TO LEARN A NEW BRANCH OF THE BUSINESS WITH THE EVENTUAL VIEW OF TAKING MANUFACTURING CHARGE OF IMPORTANT DEPARTMENT IN LARGE PLANT IN NEW YORK CITY. ADDRESS FIRST CLASS, CARE THE METAL INDUSTRY.

WANTED—An experienced man of education and good address, able to contract and promote work properly in architectural bronze work. Must be able to deal with architects, contractors and be thoroughly posted in all the business pertaining to obtaining orders and producing of the goods. A good salary will be paid such a man and any correspondence will be treated confidentially. Address CAPITAL, care THE METAL INDUSTRY.

SITUATIONS OPEN—Continued

WANTED—LACQUERERS capable of taking charge of a lacquer room. Must understand the application of lacquer and be able to handle help. Only good men with references need apply. Address NEW ERA LUSTRE COMPANY, NEW HAVEN, CONN.

WANTED—A1 Brass Finisher. Must be a good metal turner and careful bench mechanic and able to handle men. To the right man a good offer will be made. Give references and state experience. Address WEST, care THE METAL INDUSTRY.

WANTED—Foreman for press room in a brass goods factory. One who is a good die setter and capable of handling help. Address, stating where last employed and salary expected, PRESS ROOM, care THE METAL INDUSTRY.

WANTED—First-class plater. One who is capable of making all finishes. Address, stating salary expected, PLATER, care THE METAL INDUSTRY.

WANTED—Bench hands on brass work. Steady work all the year. Address BENCH HANDS, care THE METAL INDUSTRY.

WANTED—PLATERS and POLISHERS, $3.50 to $4.00 per day. Also fixture hangers and metal workers. ARTHUR R. HASKINS, Inc., 1301 Broadway, Oakland, Cal.

WANTED—FOREMAN MOLDER for brass foundry. Must be thoroughly up on mixtures and able to handle men and turn out work. Give references and salary expected. Address ALUMINUM, care THE METAL INDUSTRY.

SITUATIONS WANTED

SITUATION WANTED—Position desired as FOREMAN by a first-class plater. Expert on solutions and finishes. Address FINISHES, care THE METAL INDUSTRY.

SITUATION WANTED—Position by expert Electro-Plater. 20 years' experience. Brass, Nickel and Copper a specialty. Unexceptional references as to character and ability. Address LATEST METHODS, care THE METAL INDUSTRY.

SITUATION WANTED—An Assayer of Drosses and experienced in analysis of Copper Alloys, White Metals, Iron, Steel, etc. Address DROSS CHEMIST, care THE METAL INDUSTRY.

SITUATION WANTED—PLATER who can furnish best of reference desires position with a reliable firm. Good hustler and can furnish references. Address STEADY PLATER, care THE METAL INDUSTRY.

SITUATION WANTED—PLATER with 14 years' experience who can mix and operate all kinds of solutions. Sober and steady. Married and 36 years old. Address SOLUTIONS, care THE METAL INDUSTRY.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

OFFICE HEADQUARTERS

When visiting New York, the out-of-town friends of THE METAL INDUSTRY are invited to make our office their headquarters, where a writing desk and telephone service will be at their disposal. Every one interested in the non-ferrous metals and alloys is invited to call.

Metal Prices, November 3, 1906

METALS.	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER	
Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	$22.50
Electrolytic, car load lots	22.50
Casting, car load lots	22.00
TIN—Duty Free.	
Straits of Malacca, car load lots	43.00
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig lead, car load lots	6.00
SPELTER—Duty 1½c. per lb.	
Western car load lots	6.30
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	41.00
100 lb. lots	39.00
Ton lots	38.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons, cask lots	25.75
Hallets, cask lots	24.75
Other, cask lots	24.50
NICKEL—Duty 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.50 to .60
MANGANESE—Duty 20%	.70
MAGNESIUM—Duty Free	$1.50 to $1.60
BISMUTH—Duty Free	1.50 to 1.60
CADMIUM—Duty Free	1.80 to 1.85
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	.70⅞
PLATINUM—Duty Free	38.00
QUICKSILVER Duty 7c. per lb. Price per flask	42.00

OLD METALS.	Price per lb.	
Heavy Cut Copper	19.25	19.75
Copper Wire	18.50	19.00
Light Copper	17.50	18.00
Heavy Mach. Comp	17.50	18.00
Heavy Brass	13.00	14.00
Light Brass	11.00	12.00
No. 1 Yellow Brass Turnings	13.00	14.00
No. 1 Comp. Turnings	14.00	15.00
Heavy Lead	5.50	5.70
Zinc Scrap	4.25	4.75
Scrap Aluminum, sheet, pure	30.00	31.00
Scrap Aluminum, cast, alloyed	25.00	26.00
Scrap Aluminum, turnings	10.00	12.00
Old Nickel	15.00	25.00
No. 1 Pewter	31.00	32.00

	Price per lb.
SILICON COPPER, according to quantity	.38 to .40
PHOSPHOR COPPER, 5%	.26 to .28
Phosphor Tin	.47 to .48
Brass Ingot, Yellow	.14 to .17
Brass Ingot, Red	.19 to .21
Bronze Ingot	.17 to .20
Manganese Bronze	.20 to .22
Phosphor Bronze	.22 to .25

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	8.40
Open casks	8.90

PHOSPHORUS—Duty 18c. per lb.	
According to quantity	.40 to .60

PRICES OF SHEET COPPER.

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb. sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	27	27	27	27	27	28
	Longer than 72 ins. Not longer than 96 ins.	27	27	27	27	27	28
	Longer than 96 ins.	27	27	27	27	27	29
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	27	27	27	27	27	29
	Longer than 72 ins. Not longer than 96 ins.	27	27	27	27	27	29
	Longer than 96 ins. Not longer than 120 ins.	27	27	27	27	28	30
	Longer than 120 ins.	27	27	27	28	29	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	27	27	27	28	29	31
	Longer than 72 ins. Not longer than 96 ins.	27	27	27	28	30	32
	Longer than 96 ins. Not longer than 120 ins.	27	27	27	29	31	35
	Longer than 120 ins.	27	27	28	30	33	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	27	27	27	28	30	33
	Longer than 72 ins. Not longer than 96 ins.	27	27	27	29	31	36
	Longer than 96 ins. Not longer than 120 ins.	27	27	28	30	33	
	Longer than 120 ins.	28	28	29	31	35	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	27	27	28	30	35	
	Longer than 96 ins. Not longer than 120 ins.	27	27	29	32	37	
	Longer than 120 ins.	28	28	30	35		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	28	28	30	33		
	Longer than 96 ins. Not longer than 120 ins.	29	29	31	34		
	Longer than 120 ins.	30	30	32	36		
Wider than 108 ins.	Not longer than 132 ins.	31	31	33			
	Longer than 132 ins.	32	32	35			

Rolled Round Copper, ⅜ inch diameter or over, 27 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, November 3, 1906

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb..... 31c.
12 oz. and up to 14 oz. to square foot, per lb..... 32c.
10 oz. and up to 12 oz..... 34c.
Lighter than 10 oz. ..... 37c.
Circle less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS.

Prices are for 100 lbs. or more of Sheet Metal in one order.

Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and	2	12	14	16	18	20	22	24	26	28
including	12	14	16	18	20	22	24	26	28	30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 8 per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, 3 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE.

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass.	Low Brass.	Gilding Bronze and Copper.
All Nos. to No. 10, inc.....	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount from list, brass, 6 per cent; gilding, bronze and copper, 4 per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, discount brass, 1 per cent; gilding, bronze and copper, net list.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 25c. per lb.
Seamless Copper Tubing 29c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	33	32	27	26	25	25	25	25	25	25	25	26	27	29	31	32

BRAZED BRASS TUBING.

Brown & Sharpe's Gauge the Standard.

										Per lb.
Plain	Round	Tube,	⅜	in.	up to	2	in.,	to No. 19,	inc.....	$0.35
"	"	"	¾	"	"	⅜	"	" 19,	"	.36
"	"	"	½	"	"	⅝	"	" 19,	"	.38
"	"	"	⅝	"	"	½	"	" 19,	"	.41
"	"	"	¾	"	"	⅝	"	" 19,	"	.48
"	"	"	⅞	"	"	¾	"	" 19,	"	.65
"	"	"	1	"	"	⅞	"	" 19,	"	1.00
"	"	"	1⅛	"	"	1	"	" 19,	"	1.50
Smaller than ⅛ inch.....										Special
2 inch to 3 inch, to No. 19, inclusive.....										.38
3 inch										.40
Over 3 inch to 3½ inch.....										.45
Over 3½ inch.....										.50

Bronze and copper advance 3 cents. Discount from list 20 per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, discount 17½ per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	*3in. .. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.	Cutting to Length.	Polishing or Satin Finishing one Side.
No. 13 and heavier..	47	47	49	49	49	49	52	52	52	1	2
" 14.....	47	47	49	49	49	49	52	52	52	1	2
" 15.....	47	47	49	49	49	49	52	52	52	1	2
" 16.....	47	47	49	49	49	49	52	52	52	1	2
" 17.....	47	47	49	49	49	49	52	52	52	1	3
" 18.....	47	47	49	49	49	49	52	52	55	1	3
" 19.....	47	47	49	49	49	49	52	53	56	1	4
" 20.....	47	49	49	49	49	51	54	55	57	1	4
" 21.....	47	51	51	51	51	53	56	57	63	2	5
" 22.....	47	51	51	51	53	53	56	60	64	2	5
" 23.....	47	51	51	51	53	53	56	62	65	2	6
" 24.....	47	51	53	55	55	55	58	64	67	2	6
" 25.....	49	52	54	56	56	56	59	66	70	2	7
" 26.....	49	52	55	59	59	59	64	68	74	2	8
" 27.....	49	53	57	61	61	62	67	71	77	2	10
" 28.....	49	53	59	61	62	62	69	75	80	2	11
" 29.....	51	54	61	63	65	65	74	80	85	2	13
" 30.....	51	55	63	65	69	75	82	85	90	2	15
" 31.....	56	60	68	71	76	84	87	90	96	3	17
" 32.....	58	62	70	74	82	90	97	103	108	3	19
" 33.....	60	64	73	78	86	97	104	113	123	3	21
" 34.....	63	68	75	83	91	104	116	123	133	3	25
" 35.....	..	78	83	93	103	113	128	138	..	..	.*
" 36.....	.	93	103	113	128	133	148	..	..	..	..
" 37.....	..	117	127	142	157	172	187	..	..	..	..
" 38.....	..	137	152	167	182	197	217	..	..	.	..
" 39.....	..	157	177	197	217	237	..	..	..	..	..
" 40.....	..	187	217	237	257	..	..	..	..	..	..

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

Stubs' G.	¼"	⅜"	½"	⅝"	¾"	1"	1½"	2"	2½"	2¾"
4 to 11....	..	..	96	86	83	77	67	61	61	61
12.....	..	1.08	96	86	83	77	67	61	61	61
13.....	..	1.08	96	86	83	77	67	64	64	64
14.....	..	1.08	96	86	83	77	67	64	64	64
15.....	..	1.12	96	89	86	80	70	67	67	67
16.....	..	1.15	99	93	89	83	70	70	70	70
17.....	..	1.18	1.02	96	93	86	73	73	73	73
18.....	1.85	1.24	1.05	99	93	86	77	77	77	80
19.....	1.88	1.28	1.08	1.02	99	93	83	80	80	83
20.....	1.95	1.31	1.15	1.08	1.05	99	89	86	86	89
21.....	2.01	1.37	1.21	1.15	1.12	1.05	99	93	93	96
22.....	2.17	1.44	1.24	1.18	1.15	1.08	1.05	99	1.05	1.05
23.....	2.33	1.50	1.31	1.24	1.21	1.15	1.15	1.08	1.15	1.15
24.....	2.48	1.60	1.37	1.31	1.28	1.18	1.21	1.21	1.24	..
25.....	2.65	1.69	1.47	1.37	1.34	1.28	1.34	..	..	..

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge.	0000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	43	43½	43½	44	44½	45	45½	46	47	48	49	52	57

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 40 per cent.

Muntz or Yellow Metal Sheathing (14" x 48").....20c. lb. net base.
" " " Rectangular Sheets other than Sheathing .....22c. " " "
" " " Rod .....21c. " " "
Tobin Bronze Rod.....23c. " " "
Above are for 100 lbs. or more in one order.